THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVII. No. 1460.] LONDON, MAY 5, 1891. [43RD YEAR. Price 6d.

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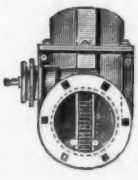

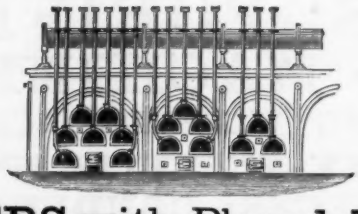

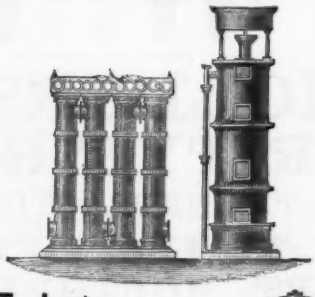

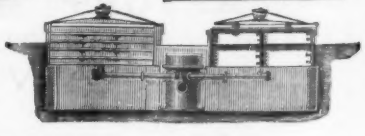

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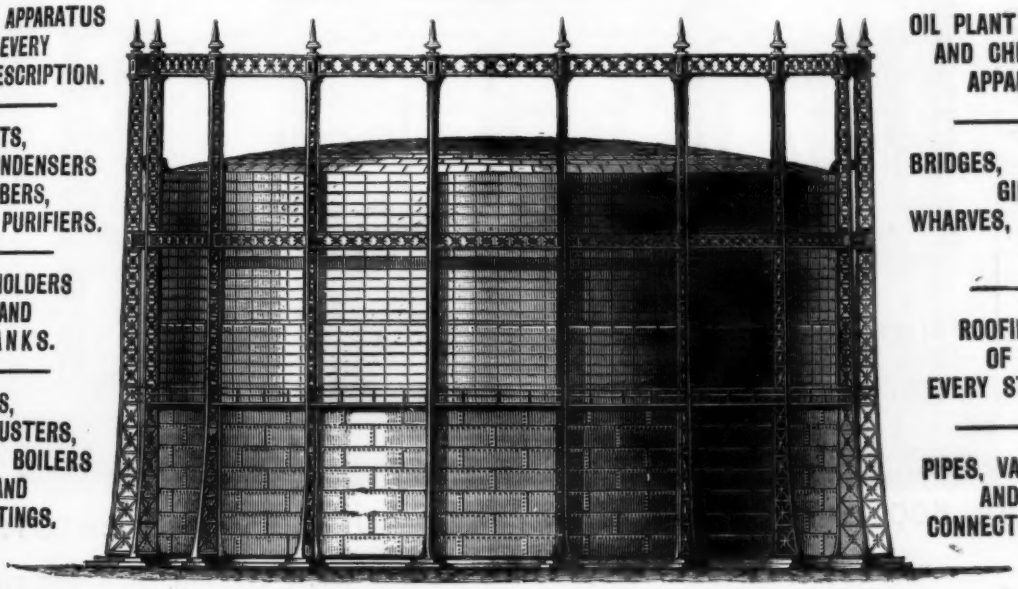

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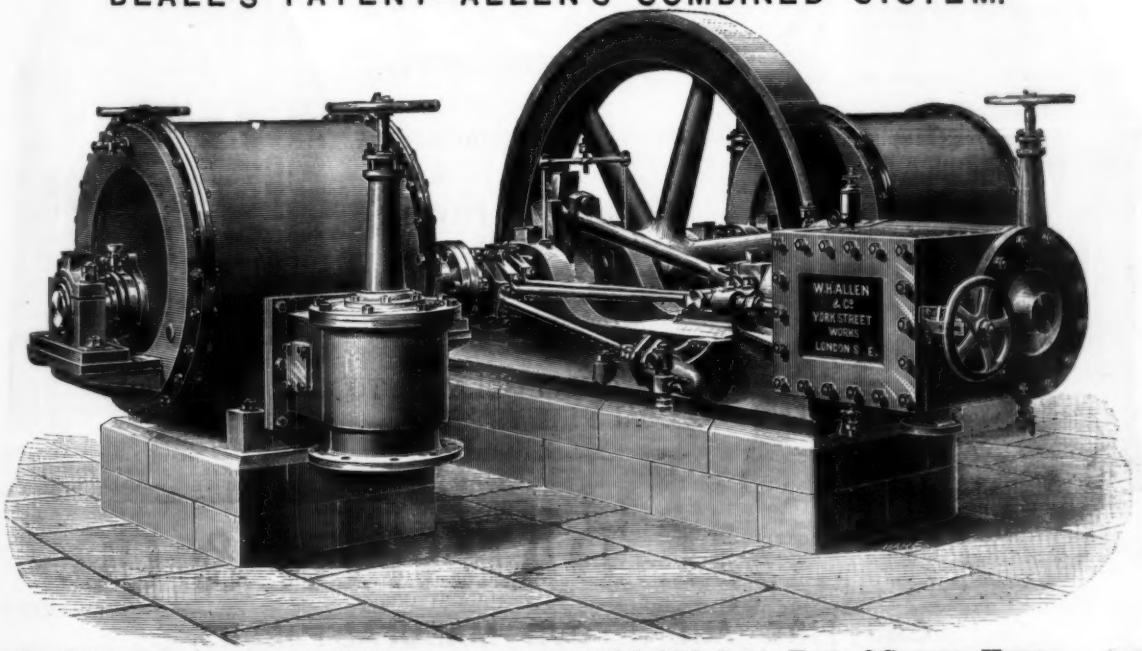

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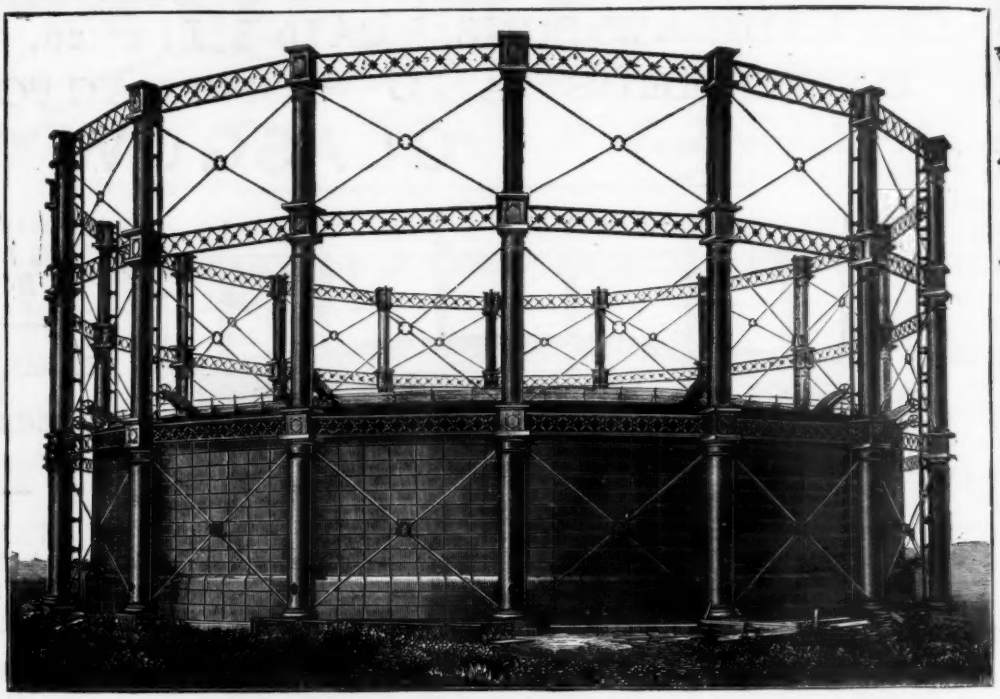

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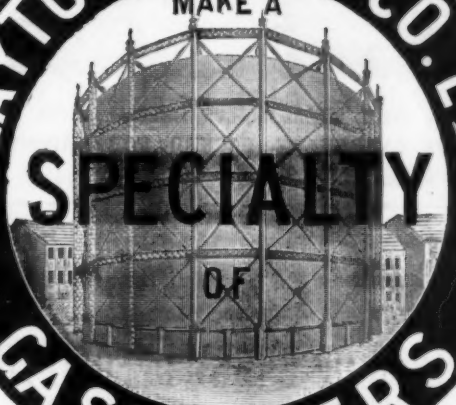

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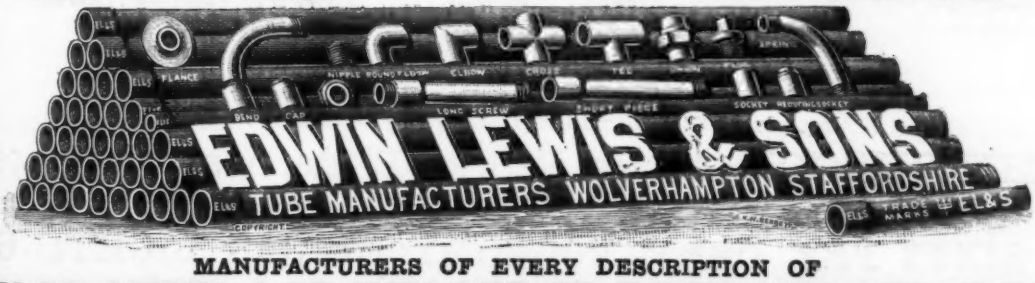

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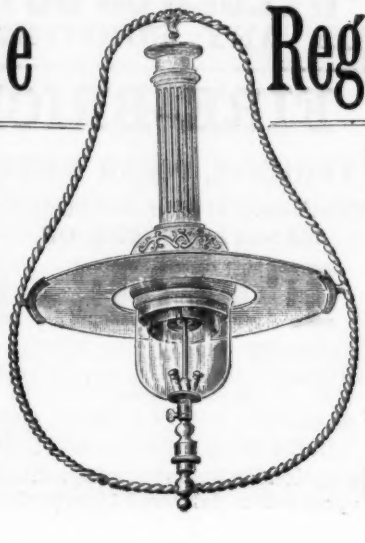

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THESE IMPROVED "BUNDLES" ARE CONSTRUCTED CHIEFLY OF WOOD AND TO TEMPLATES OF ORIGINAL IRON "BUNDLES," AND CAN BE EASILY FITTED IN PLACE OF THE LATTER BY UNSKILLED LABOUR.

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GAS PLANT WORKS, NEWTON HEATH, MANCHESTER,

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TOTAL WEIGHT REDUCED from 30 per cent. to 50 per cent.

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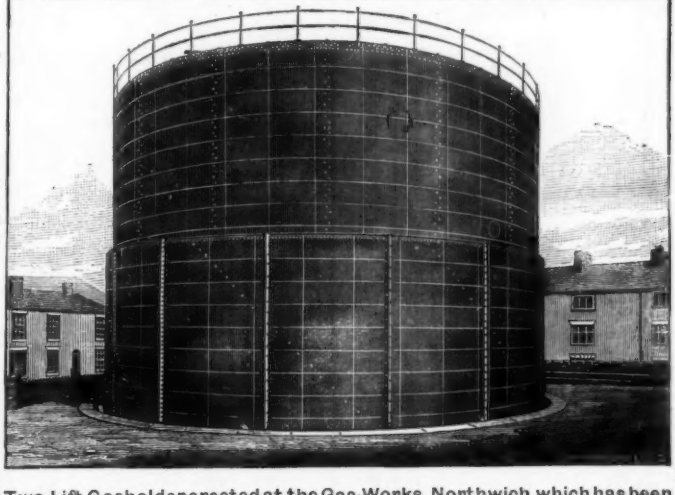

Two-Lift Gasholder erected at the Gas-Works, Northwich, which has been in continuous work since Jan. 3, 1890, and has been subjected to most severe tests from heavy gales, with perfectly satisfactory results.

COST OF PAINTING SAVED for the Columns and Girders.

TILTING UTTERLY IMPOSSIBLE; And as there are fewer parts, there is less liability for the Gasholder to get out of order in working.

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The removal of heavy guide carriages and rollers from the top curbs considerably lowers the centre of gravity of the structure, and dispenses with the extra strength of sheeting necessary to carry these at the points where they are attached to the gasholder.

The plan adapts itself to telescoping to any reasonable extent, and enables very shallow holders or lifts to be employed with perfect stability.

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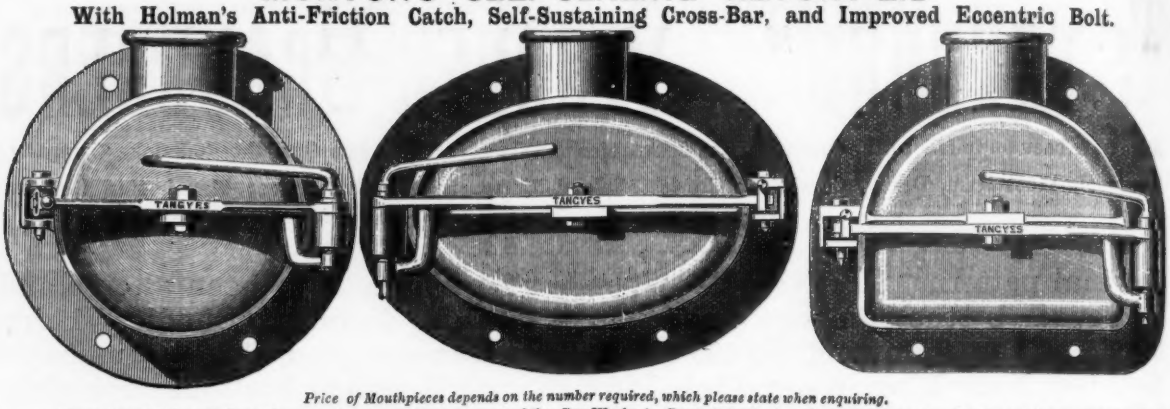
MORTON'S SELF-SEALING RETORT-LID

With Holman's Anti-Friction Catch, Self-Sustaining Cross-Bar, and Improved Eccentric Bolt.



Price of Mouthpieces depends on the number required, which please state when enquiring.

These Retort Lids and Fastenings are in extensive use in most of the Gas-Works in Great Britain, America, and on the Continent, and have almost entirely displaced the older method of sealing by a luting of lime or other material. The Lids are made in three forms, round, oval, and D (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these lids are recommended to make their selection, in order to avoid cost of pattern making, delays, &c., &c.

Mouthpieces with Circular Lids for Round Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
3494	14 ins.	14 ins.	12½ ins.	£0 19 0
2932	15 ,,	15 ,,	14 ,,	1 0 0
3453	15 ,,	15 ,,	12½ ,,	1 0 0
3497	15 ,,	15 ,,	15 ,,	1 0 0
3030	16 ,,	16 ,,	10½ or 11⅝ ,,	1 1 0
4549	16 ,,	16 ,,	15½ ,,	1 1 0
6262	16 ,,	16 ,,	13½ ,,	1 1 0
6396	16 ,,	16 ,,	15 ,,	1 1 0
7668	16 ,,	16 ,,	17⅝ ,,	1 1 0
10289	16 ,,	16 ,,	11 ,,	1 1 0
3856	17 ,,	17 ,,	15 ,,	1 3 0
7125	17 ,,	17 ,,	6 ,,	1 3 0
933	18 ,,	18 ,,	11⅝ ,,	1 5 0
4045	18 ,,	18 ,,	14 ,,	1 5 0
6397	18 ,,	18 ,,	15 ,,	1 5 0
8013	18 ,,	18 ,,	15 ,,	1 5 0

Taper Circular Mouthpieces with Circular Lids for Round Retorts.

Pattern No.	Front.	Back.			
13001	15 to 21 ins.		21 ins. diam.	13½ ins.	£1 0 0
13261	15 ,, 24 ,,		15 ,,	13½ ,,	1 0 0
12995	15 ,, 30 ,,		30 ,,	13 ,,	1 0 0
9562	18 ,, 21 ,,		21 ,,	12½ ,,	1 5 0
10425	18 ,, 21 ,,		21 ,,	4½ ,,	1 5 0
13418	18 ,, 22 ,,		22 ,,	12 ,,	1 5 0
13396	20 ,, 20⅝ ,,		20⅝ ,,	4 ,,	1 11 0

Mouthpieces with Circular Lids for D Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
5348	14 ins.	14 × 13 ins.	7 ins.	£0 19 0
14209	14 ,,	14 ,, 13 ,,	15½ ,,	0 19 0
14231	14 ,,	12⅜ ,, 12⅜ ,,	10 ,,	0 19 0
3463	15 ,,	15 ,, 18 ,,	14 ,,	1 0 0
6678	15 ,,	15 ,, 14 ,,	12 ,,	1 0 0
3661	15½ ,,	15½ ,, 18 ,,	12 ,,	1 1 0
13052	16 ,,	16 ,, 13 ,,	18 ,,	1 1 0
5601	16 ,,	16 ,, 14 ,,	15 ,,	1 1 0
6827	16 ,,	16 ,, 14 ,,	17 ,,	1 1 0
4494	16 ,,	16 ,, 14 ,,	14 ,,	1 1 0
3548	16 ,,	16 ,, 15 ,,	12½ ,,	1 1 0
6677	16 ,,	16½ ,, 13¾ ,,	10½ ,,	1 1 0
9645	16 ,,	16½ ,, 13½ ,,	12½ ,,	1 1 0
4434	16 ,,	17⅜ ,, 14 ,,	14 ,,	1 1 0
6469	16 ,,	18 ,, 14 ,,	15 ,,	1 1 0
9015	16 ,,	18 ,, 14 ,,	18½ ,,	1 1 0
4327	16 ,,	18 ,, 15 ,,	15½ or 19 ,,	1 1 0
8049A	16 ,,	18 ,, 15 ,,	17⅞ ,,	1 1 0
6137	16 ,,	20½ ,, 13½ ,,	13½ ,,	1 1 0
5918	17 ,,	13 ,, 14 ,,	14 or 17 ,,	1 3 0
5053	17 ,,	19⅜ ,, 12 ,,	14½ ,,	1 3 0
7548	17 ,,	20 ,, 13 ,,	15 ,,	1 3 0
6468	17 ,,	20 ,, 16 ,,	15½ ,,	1 3 0
4316B	17 ,,	21 ,, 14 ,,	14 ,,	1 3 0
7975	17 ,,	21 ,, 15 ,,	14½ ,,	1 3 0
13459	17 ,,	21½ ,, 13½ ,,	15 ,,	1 3 0
14284	18 ,,	18 ,, 13½ ,,	19 ,,	1 5 0
12990	18 ,,	18 ,, 15 ,,	15 or 19 ,,	1 5 0
7135	18 ,,	18⅜ ,, 15 ,,	13 ,,	1 5 0
10221	18 ,,	18 ,, 16 ,,	19⅜ ,,	1 5 0
4506	18 ,,	20 ,, 13 ,,	19½ ,,	1 5 0
6470	18 ,,	20 ,, 13 ,,	15 ,,	1 5 0
6818	18 ,,	20 ,, 13½ ,,	17½ ,,	1 5 0
13998	18 ,,	20 ,, 14 ,,	19½ ,,	1 5 0
4083	18 ,,	20 ,, 15 ,,	16 ,,	1 5 0
5306	18 ,,	20½ ,, 14 ,,	13½ ,,	1 5 0
13295	18 ,,	20½ ,, 14 ,,	19½ ,,	1 5 0
7356	18 ,,	20½ ,, 13½ ,,	13 ,,	1 5 0
4569	18 ,,	21 ,, 14 ,,	18 ,,	1 5 0
3628	18 ,,	21 ,, 15 ,,	16 ,,	1 5 0
13999	18 ,,	22 ,, 14 ,,	19½ ,,	1 5 0
7640	18 ,,	22 ,, 12½ ,,	18½ ,,	1 5 0
14250	19 ,,	19 ,, 14 ,,	19 ,,	1 8 6
14286	19 ,,	20 ,, 13½ ,,	20 ,,	1 8 6
7971A	20 ,,	20 ,, 15 ,,	18 ,,	1 11 0
14285	20 ,,	21 ,, 13½ ,,	19 ,,	1 11 0

Mouthpieces with Circular Lids for Oval Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
13658	14 ins.	14 × 12 ins.	15 ins.	£0 19 0
4356	14 ,,	18½ ,, 12 ,,	13½ ,,	0 19 0
6851	15 ,,	16 ,, 14 ,,	13 ,,	1 0 0
3629	15 ,,	18½ ,, 13¼ ,,	14 ,,	1 0 0
3580	15 ,,	21 ,, 15 ,,	15 ,,	1 0 0
6264	16 ,,	18½ ,, 15½ ,,	15½ ,,	1 1 0
5210	16 ,,	20 ,, 14 ,,	15 ,,	1 1 0
6263	16 ,,	24 ,, 16 ,,	18½ ,,	1 1 0
5370	17 ,,	20 ,, 14 ,,	14 ,,	1 3 0
6832	17 ,,	20 ,, 14 ,,	17 ,,	1 3 0
6183	17 ,,	20 ,, 15 ,,	15 ,,	1 3 0
4289	17 ,,	21 ,, 15 ,,	14 ,,	1 3 0
5270	17 ,,	22 ,, 14 ,,	14 ,,	1 3 0
3631	18 ,,	18 ,, 14 ,,	20 ,,	1 5 0
3681	18 ,,	21 ,, 14 ,,	13½ or 15 ,,	1 5 0
3554	18 ,,	21 ,, 15 ,,	14½ ,,	1 5 0
7957	18 ,,	23 ,, 16 ,,	14 ,,	1 5 0
8048A	19 ,,	25½ ,, 15 ,,	18 ,,	1 8 6

Mouthpieces with Oval Lids for Oval Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
9800	18 × 14½ ins.	18 × 14½ ins.	15 ins.	£1 5 0
9205	20 ,, 12 ,,	24 ,, 14 ,,	10½ ,,	1 10 0
10000	20½ ,, 14½ ,,	20½ ,, 14½ ,,	16 ,,	1 10 0
9680	21 ,, 15 ,,	21 ,, 15 ,,	15 ,,	1 12 0
10056	21 ,, 14½ ,,	21 ,, 14½ ,,	15½ ,,	1 12 0
13218	21 ,, 15 ,,	21 ,, 15 ,,	17 ,,	1 12 0
10514	22½ ,, 18⅜ ,,	22½ ,, 18⅜ ,,	18⅜ ,,	1 13 0
13766	20 ,, 17 ,,	20 ,, 17 ,,	15½ ,,	1 15 0
13269	24 ,, 15 ,,	24 ,, 15 ,,	15 ,,	1 18 0
13884	24 ,, 15 ,,	24 ,, 15 ,,	10 ,,	1 18 0

Mouthpieces with D Lids for D Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimension of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
12292	15½ × 13 ins.	15½ × 13 ins.	12 ins.	£1 2 0
9967	16 ,, 14 ,,	16 ,, 14 ,,	15½ ,,	1 3 0
13574	16½ ,, 13½ ,,	16½ ,, 18⅜ ,,	12½ ,,	1 4 0
9899	18 ,, 12 ,,	18 ,, 12 ,,	14 ,,	1 4 0
12980	16 ,, 16 ,,	16 ,, 16 ,,	18 ,,	1 6 0
13900	18 ,, 13⅜ ,,	18 ,, 13 ,,	15 ,,	1 6 0
9912	18 ,, 13½ ,,	18 ,, 13½ ,,	17 ,,	1 6 0
9962	18 ,, 13½ ,,	18 ,, 18½ ,,	16 ,,	1 6 0
10982	18 ,, 18½ ,,	18 ,, 14 ,,	15 ,,	1 6 0
11098	18 ,, 14 ,,	18 ,, 14 ,,	12 ,,	1 6 0
9492	20 ,, 13 ,,	20 ,, 13 ,,	15 ,,	1 10 0
9208	20 ,, 13 ,,	20 ,, 13 ,,	19½ ,,	1 10 0
10251	20 ,, 13 ,,	20 ,, 13 ,,	15½ ,,	1 10 0
12964	20 ,, 13 ,,	20 ,, 13 ,,	18½ ,,	1 10 0
9909	20 ,, 13½ ,,	20 ,, 13½ ,,	17 ,,	1 10 0
12969	19½ ,, 15½ ,,	19½ ,, 15½ ,,	14 ,,	1 11 0
13781	20 ,, 15 ,, Front. / 21 ,, 15 ,, Back.	21 ,, 15 ,,	15 ,,	1 11 0
14287	20½ ,, 14⅞ ,,	20½ ,, 47⅞ ,,	17 ,,	1 11 0
7692	21 ,, 15½ ,,	21 ,, 15½ ,,	16 ,,	1 11 0
12978	20 ,, 16 ,,	20 ,, 16 ,,	17 ,,	1 11 0
13252	20 ,, 16 ,,	20 ,, 16 ,,	18 ,,	1 11 0
13220	21 ,, 15 ,,	21 ,, 15 ,,	17 ,,	1 11 0
13992	21 ,, 16 ,,	21 ,, 16 ,,	17 ,,	1 11 0
8977	21½ ,, 18⅜ ,,	21½ ,, 13⅜ ,,	18⅜ ,,	1 12 0
8976	21½ ,, 18⅜ ,,	21½ ,, 18⅜ ,,	18⅜ ,,	1 12 0
10497	21½ ,, 18⅜ ,,	21 ,, 18½ ,,	18 ,,	1 12 0
8037	21½ ,, 18⅜ ,,	21½ ,, 18⅜ ,,	18⅜ ,,	1 12 0
9908	21½ ,, 18½ ,,	21½ ,, 18½ ,,	15 ,,	1 12 0
10404	21½ ,, 18½ ,,	22 ,, 14 ,,	18¾ ,,	1 12 0
12410	21½ ,, 18⅜ ,,	22 ,, 14 ,,	19 ,,	1 12 0
13822	21½ ,, 18⅜ ,,	22 ,, 14 ,,	15 ,,	1 12 0
10515	22½ ,, 19⅜ ,,	22½ ,, 12⅜ ,,	18½ ,,	1 12 0
7924	24 ,, 14 ,,	24 ,, 14 ,,	15⅜ ,,	1 13 0
13807	24 ,, 15¼ ,,	24 ,, 15¼ ,,	16 ,,	1 14 0
9015B	25 ,, 14 ,,	25 ,, 14 ,,	12½ ,,	1 14 0
10932	25 ,, 14 ,,	24 ,, 14 ,,	13½ ,,	1 15 0
12944B	22 ,, 16 ,,	22 ,, 16 ,,	16 ,,	1 15 0
14037	22 ,, 16 ,,	2 ,, 16 ,,	16 ,,	1 15 0
14119	22 ,, 16 ,,	22 ,, 16 ,,	18 ,,	1 15 0

Patterns marked A have Sockets at back to connect to Retorts; all the others are flanged. Patterns marked B have curved bottoms.

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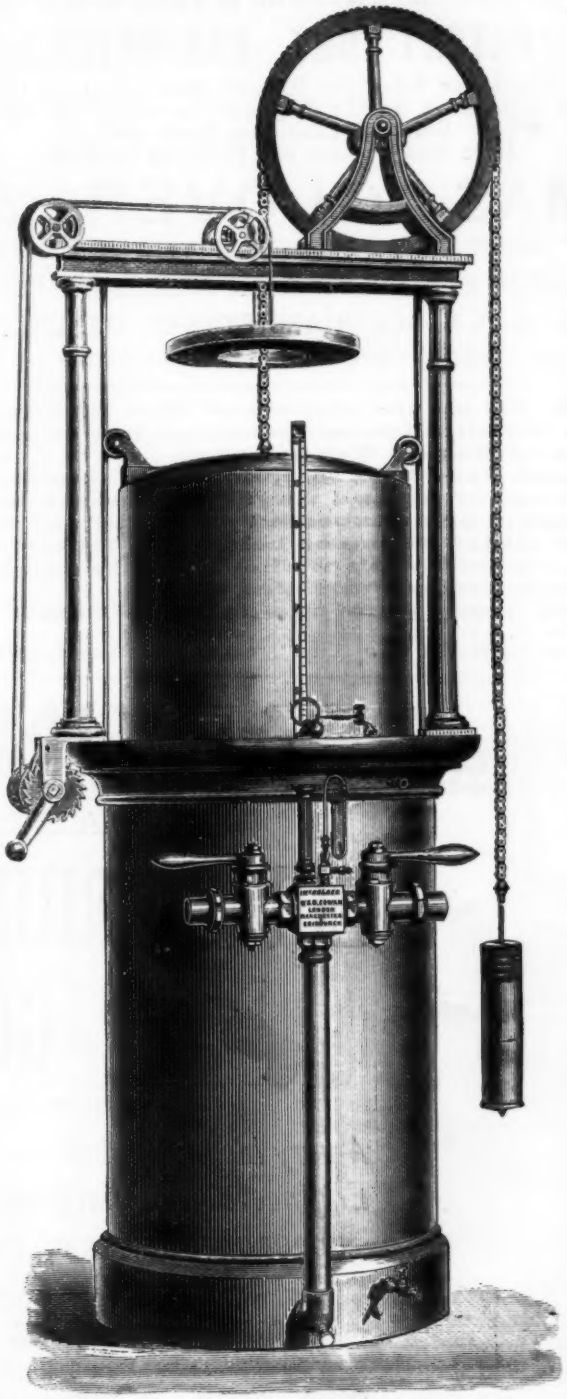

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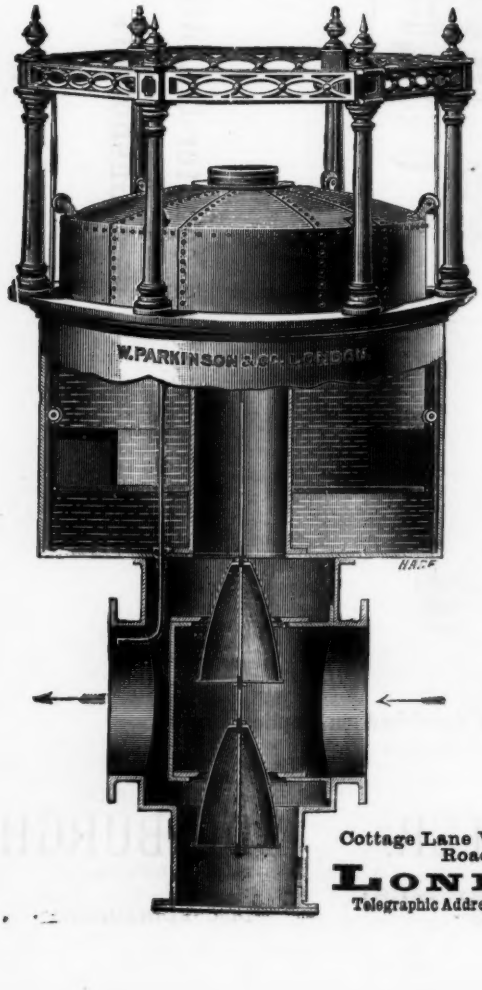

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[See also Advt. p. 62.

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THE
JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 5, 1891.

Two Incidents.

Two incidents of the past week must be held to be worth commemoration by the industrial community of this country, albeit that they are of widely different nature. One is the occurrence of "Labour Day;" the other is the first meeting of the Royal Commission on Labour. With regard to the former event, it is difficult to get up any real enthusiasm. The Socialists who have "engineered" the Eight-Hour movement have carefully cut out the element of permanent attraction from it by their ostentatious proclamation that the actual Eight-Hour cry is likely to be only a prelude to a Six-Hour, or a Four-Hour clamour, ending logically in a No-Work policy. It is obviously impossible to go to the stake or gibbet for a patently provisional religion. One of the Labour journals has come out with a pictorial design, supposed to be illustrative of the Eight-Hour movement, which suggests ample reflections to the thoughtful observer of these things. It exhibits a man with a pick, who is chained to a rock by a band round his body bearing the inscription "Labour," shading his eyes with his hand from the dazzling effect of the rising sun of May Day, which is apparently commencing an eight-hour transit of the sky Seeing that on the 1st of May the sun is above the horizon for 14 hours 46 minutes, it would be enough to startle anybody even though chained to a rock, if he really did appear in the sky with the announcement that he only meant to make an eight-hour day of it. This, however, is not the most remarkable point of the design under notice. The idea evidently meant to be conveyed is that a man who earns his daily bread is a chained serf, which is a queer outcome of Social Democratic doctrines. What then becomes of that Dignity of Labour which we have all been bidden to admire? If the proper ideal for a working man is absolute cessation of the need for working, then the idlers of to-day ought to be envied as people who have already entered into their heaven. Is this logical? It looks like it. In this case it becomes still more difficult to feel any enthusiasm upon such a subject. An apotheosis of Utter Laziness is assuredly something to shudder at rather than to admire.

Meanwhile, it should be observed that the so-called Labour Day all over the Continent has been an occasion of anxiety for Governments; and the grand enthusiasm of the Eight-Hour propagandists has not been distinguishable from rioting of the old-fashioned kind. Mr. Walter Crane has sent to the *Labour World* a copy of verses in which he describes the mobs that were to assemble on May Day as "not in shining warfare," and says "no "sword they bear, or flashing blade;" but they used plenty of stones and cudgels in many places, and gave the professional wielders of "flashing blades" a great deal of trouble to keep them from doing infinite mischief. There is too much reason to fear that the new "demonstrators" in most cases are only the old "mobs" writ large, but needing precisely the same kind of treatment that Napoleon Bonaparte used to reduce revolutionary chaos into order. Some misguided fanatics celebrated their May Day in such fashion as to be prevented from ever greeting another. The Hyde Park meeting in London, thanks to the fine weather, was a very big thing. Nothing new transpired to help any one to a clearer conception of the manner in which the object of the demonstration is to be brought about; and the whole affair passed off with highly creditable peaceableness. It was, in fact, a gigantic "outing." It might be a fruitful inquiry to endeavour to ascertain how far this modern fashion of Sunday mass meetings is responsible for the remarkably increased consumption of exciseable articles which the Chancellor of the Exchequer has found so convenient of late years. It is certain that observation of these immense gatherings, while not revealing so much drunkenness and disorder as would have been found in an English mob a few years ago, establishes the fact that the average demonstrator is anything but an abstainer from the creature comforts of liquor and tobacco.

It is a relief to turn from the new-fangled observance of May Day as an Anarchists' festival, to the first meeting of the Royal Commission, which was held on Friday in one of the new rooms adjoining Westminster Hall, under the presidency of the Marquis of Hartington. The business transacted on this occasion was, of course, purely preliminary, as the scheme of the inquiry has not yet been settled. It is understood that a good beginning was made in getting the Commissioners personally acquainted with each other, and in settling various questions of procedure. The Commission will not meet again before Whitsuntide; after which the hard work of the investigation will begin. Nobody professes to know what the Commission will do, or still less what good may come of the appointment. If nothing else happens, however, it is certain that the existing conditions of employment for wages in the United Kingdom will be ascertained with a degree of precision that should cut the ground from

under the feet of the most disingenuous agitators. The most deplorable aspect of recent labour affairs is that which exhibits the power of brazen and unscrupulous lying to delude not only men of the so-called working classes, but even some who ought to possess more acuteness in weighing statements. Every strike organized by New Unionist wire-pullers has been encrusted, so to speak, with big, blatant, unmistakeable lies. What imposture has failed to effect, violence and intimidation have been used to compass. It will be a sufficient justification for the appointment of the Royal Commission if facts are put in evidence too clearly to be obscured by the asseverations of interested demagogues. Truth is great, and will prevail; but it is unfortunately the loud lie that sticks in the popular ear, and, when once entertained, is hard to oust quickly by modest facts.

The Affairs of the Paris Gas Company.

Last week we published a full abstract of the report of the Directors, with the principal figures of the accounts relating to the past year's working of the Paris Gas Company, which always contains something interesting for English professional readers. Indeed, a Company that takes upwards of £3,000,000 sterling a year for gas must inevitably be worthy of notice. Unfortunately, the vicious system under which the gas supply of Paris is carried on, prevents those who are responsible for the management of the undertaking from year to year from showing what they could do with gas sold in the French capital under a more natural *régime*. As it is, however, the Directors and their principal advisers must be credited with displaying much business capacity within the limits marked out by their circumstances. As an example of this may be cited what has been done with the so-called "rising services" for tenement houses. Perceiving that Paris was being rebuilt upon the "flats" system, the Directors of the Gas Company went a good deal outside their beaten track to meet the altered conditions of Parisian domestic life; and they have found their reward in a large increase of business. Nearly 50 per cent. of the whole number of gas consumers in Paris are now supplied upon what is, comparatively speaking, a novel system. Selling gas for day consumption is a line of business in which the Paris Company are also prospering; and 26·15 per cent. of the whole output is burnt by day—principally, of course, for cooking and the generation of motive power. The length of gas-mains kept charged in Paris is now 1384 miles. Slight reference is made by the Directors to the abortive Quinquennial Technical Commission which has been frequently discussed in these columns. This is the third inquiry of the kind that has been instituted by the Paris Municipality with the view of accounting for the puzzling fact that while the cost of gas manufacture, regarded as a technical operation, remains pretty constant, the profits of the Company have increased enormously. The last Commission awoke to a sense of the truth much more acute than that enjoyed by either of its precursors, and plainly told the people of Paris that the prime cost of gas depends much more upon commercial considerations, of which the Company's concession takes no cognizance, than upon the technical operations which it expressly reserves for inquiry. Seeing that the Municipality benefit enormously from this fact, it should at least drop the hypocrisy of pretending to desire a wholesale reduction in the price of gas. Doubtless, gas is outrageously dear in Paris; but so are petroleum and electricity, and for the same reason—the imposts which the National and Municipal Governments have placed upon them. This being so, the Municipality, while taking the plunder, should certainly bear its share of the blame. The fact is that everything is dear in Paris, which is one of the most expensive places of residence or of business, as it is one of the pleasantest, in the world. People who profess to wonder why London is not gilt and varnished like Paris, do not think of the bill for all this luxury, which falls crushingly upon residents with limited incomes.

Shall Gas Companies Sell or Work Up their Tar.

The subject of Gas Companies and Corporation Gas Departments undertaking to work up their own tar has occupied the attention of gas-works managers owning Newcastle and Manchester as their respective business centres. It is very natural that the thoughts of these gentlemen should run occasionally in this direction; for they find themselves scattered pretty thickly round certain focuses of chemical industry to which the whole of their tar goes as a matter of course. In a sense, they send their tar to common receivers; but there is no co-operative working in this concentration of the tar trade. Instead of sending in their tar to be worked up in bulk and receiving corresponding allocations of profit, the tar producers are open to be tempted to cut each other's throats at the instigation of the very acute gentlemen who buy this interesting, but troublesome residual. The idea of a sort of co-operative tar factory, to which the gas makers of a given area should send their tar and draw in return *pro ratâ* benefits, is attractive at first sight; but, unfortunately, the more it is looked into the less workable it appears. In the first place, there are considerable legislative difficulties in the way of the formation of a syndicate of gas manufacturers, under statutory regulations, for the purpose of working up residuals; and, in the second place, it is by no means certain that, even if gas manufacturers had the power to form such a Union, it would be good for them to exercise it. The difficulty of residuals is not one of treatment, but of sale. What prospect is there that a gas manager who cannot make a good bargain for his tar, would be in a better position if, instead of having the one commodity to sell, he were troubled with a dozen? This is the question that advocates of residuals' conversion must settle with those who think differently. Isolated cases notwithstanding, we are distinctly of opinion that the best way for gas manufacturers to treat their tar is to sell it, and sell it, moreover, by short contracts, or on some other acceptable system of keeping abreast of the market.

Another Dublin Gas Lawsuit.

Whoever might have thought that the result of the recent costly arbitration upon the Dublin public lighting arrangements would restore peace to the "distressful" city in the matter of its gas supply, would have been grievously disappointed by the disclosures that formed the subject of our last week's "Legal Intelligence." For ourselves, we can honestly say that we never thought anything of the kind. The Dublin Gas Company and the Corporation are in the wrong hands for quietness to prevail in their business relations. Dublin without a bitter squabble over the gas supply would not be itself. So long as the Corporation and the Gas Directors elect to amuse themselves in this way, nobody ought to complain. The dingy city on the Liffey is dull enough, in all conscience, to make even a row over a street lamp a welcome distraction; and the Irish Bar, notoriously overmanned as it is, could badly spare the frequent briefs that mark the progress of the ancient feud. The last outbreak was almost too ridiculous, even for a Dublin gas dispute. It being almost impossible now to manufacture a grievance of any kind in connection with the street lighting proper, the Corporation Gas Inspector hit upon the ingenious idea of raking up an old difficulty about the payment for services to public lights; and, by a stroke of genius which ought to be recognized by an increase of salary, he hit upon a blind entry, which happens to be a street and yet no street, for the purpose of complicating the matter of liability. This raised a question that has been awaiting settlement for a long time, but has remained open in consequence, it would appear, of the genuine reluctance of the Dublin Corporation to take steps to end a dispute that can be depended upon to furnish a little mild excitement at any moment. The behaviour of the Gas Company in this last affair seems to have been perfectly rational. They had been in correspondence with the Corporation with reference to the cost of connecting up the lamp, and never consciously made default in giving the supply. After about six months' silence, however, they were served with a summons quite as a surprise, and have been convicted on the hard-and-fast letter of the law by a Magistrate who failed to perceive the humour of the situation. If an appeal lies from this decision, it has probably been made before now; and the world, or that part of it which takes notice of such things, will therefore be gratified with another display of what the Dublin Corporation choose to consider as "doing their duty" by the Gas Company. And yet there are people who say that the taste for humour has quite departed from the Irish people since the days of Carleton and Lever!

The Gas Industry in Massachusetts.

The report of the Massachusetts State Board of Gas and Electric Light Commissioners, abstracts of which have recently appeared in the Journal, and which was

mentioned in this column last week in connection with the subject of fatalities caused by inhaling illuminating gas, contains some out-of-the-way information relating to various matters which will bear passing mention. Among other things, a curious report relating to a fuel-gas scheme may be noticed, mainly on account of the light it throws on the contemporary condition of what may be styled popular gas engineering knowledge in that part of the world. It appears that the Board were called upon to hear an appeal by the Chelsea Gaslight Company from the decision of the Mayor and Aldermen of the city, granting to the American Fuel Company permission to lay fuel-gas pipes in certain streets of the city. The latter Company claimed to be able to produce gas by a patented process of passing steam and crude petroleum, with air under pressure, through hot iron pipes, which, after having been once heated by coal or wood, would be kept hot by burning a portion of the gas as made—the manufacture being thus continuous. It was not known how much gas would remain for sale after heating the retorts with it. "It was also said that the pipes contained "discs of different metals, so combined and arranged that "heat would be generated by electricity as the oil and "steam passed along through the pipes." The works of the Fuel Gas Company were actually started when the matter came under the cognizance of the Board, and some difficulty seems to have been found in fixing the Company to a definite programme. At length, however, a sample of the gas was obtained for analysis, when it was found that 29 per cent. of it came from the oil used, and nearly 70 per cent. was traceable to the air; only a little steam being gasified. The mild comment of the State Gas Inspector upon this precious mixture was that "the advantages of using such "a large amount of air in the manufacture of the gas are "not obvious." We have reproduced the principal statistics contained in this report; and it is satisfactory to see that, notwithstanding the severe competition to which they are subjected from cheap oil on one side and electric lighting on the other, the Massachusetts Gas Companies are growing and prospering. They are administered upon highly eclectic principles—making gas from anything that suits their purpose from time to time. Thus, while in at least one undertaking coal has taken the place of water gas as the staple product, some Companies have found it convenient, owing to scarcity of gas coal, to make a larger proportion of water gas than heretofore. The wonderful preponderance of advantage that professional advocates of water-gas systems claim as compared with coal gas is not in evidence in these impartial statistics. Dividends on Massachusetts gas stock range from nothing up to 20 per cent.; but the average is not far from 7 or 8 per cent. Among the curiosities of the report are the pure oil-gas Companies, which sell 45 to 70 candle gas at high rates. These are all small concerns. One charges nominally 11 dollars per 1000 cubic feet, but allows 50 per cent. discount. Even 5 dollars per 1000 cubic feet for 50-candle gas sounds tolerably luxurious; and the wonder is that the electricians cannot supersede even this kind of gas supply. The list of enriching materials used by the several coal-gas Companies is very varied; the Boston Gas Company alone being returned as employing for this purpose "cannel, albertite, naphtha, and residuum." Some of the water and oil gas Companies have not returned full details of the manufactures in which they have been engaged; but the Bay State Company of Boston, using the Flannery process, made 139,962,000 cubic feet of gas for sale in bulk out of 3015 tons of anthracite, 228,581 gallons of crude oil, and 453,400 gallons of naphtha, burning 1213 tons of coke for steam raising. At Worcester, the Granger process made 22,924,600 cubic feet of 18·59-candle gas from 21,618 bushels of coke in the generator, and 114,623 gallons of naphtha. In addition to this, one-sixth of a bushel of coke per 1000 cubic feet was used in steam raising. These data should be useful in proving what can be done with standard water-gas plant on the large scale.

Mr. S. Spencer, of Messrs. J. E. and S. Spencer, of Great St. Thomas Apostle, has joined the Board of the Singapore Gas Company, in place of the late Mr. Robert Rice.

Mr. John Aird, M.P., was last Wednesday invested as Senior Grand Deacon of England, on his appointment by the Prince of Wales to that office in the Grand Lodge of English Freemasons.

WATER AND SANITARY AFFAIRS.

Despite certain merits, the "shadowy" character of the London Water Commission Bill has proved fatal to its prospects before the Select Committee of the House of Commons. In the full report which we are giving of the Committee's proceedings, it will be seen that Mr. Littler made an able address on behalf of the Bill. The chief recommendation of the scheme consisted in the ample provision which it made, not only for the representation of the outlying area, but for the various interests connected with the water supply of the Metropolis, including the districts whence the supply is drawn, as well as the area to which it is given. It was even possible for the provisions of the Bill to extend as far as Shropshire. But, while undoubtedly comprehensive, the Bill was vague; and Mr. Pope, the Counsel for the New River Company, urged that the creation of the "roving Commission" which the measure proposed, for the purpose of promoting future Bills, would not effect "a single day's progress" towards the settlement of the water question. We are not sure that this need have been an objection, viewing the subject from the standpoint of the Water Companies; but it might very well carry weight with the Committee. Mr. Littler argued in favour of the "roving Commission," that it would be valuable for the purpose of conducting certain preliminary inquiries relative to the water supply; but we suppose that the Committee thought themselves sufficient for this purpose. Concerning possession of the supply, Mr. Freeman contended that this appertained to the London County Council. Putting that body in place of the Commission, Mr. Freeman had a friendly feeling towards the Corporation's Bill. But the Commission was obviously the essence of the Bill; and the Committee came to the conclusion that it was not worth while to create a new authority for the mere purpose of bringing in Bills at some future date. We may presume that if the Corporation had proposed something more in the nature of action, their Bill would have stood a better chance. As it was, the scheme looked rather like an attempt to oust the County Council; the water consumer being merely a subordinate figure in the transaction. The Bill was rejected; and, after all their fuss and trouble, including the investigation under Sir Guyer Hunter, the Corporation saw their airy bubble burst.

Sir Matthew White Ridley's Committee may be congratulated on their skill in getting on without evidence. At their preliminary meeting, they decided that Sir William Harcourt's Committee were right in recommending that the supply of water to the Metropolis should be placed under the control of some public body. This was accepted as equivalent in authority to the law of the Medes and Persians. The possibility of upsetting the proposition was looked upon as out of the question; and no evidence was solicited to show what degree of merit attaches to the present system. It is worthy of note, as mentioned by Mr. G. Fitzgerald, that Sir W. Harcourt's Committee took no evidence at all beyond financial evidence bearing on the bargain proposed by Mr. E. J. Smith's agreements. The Water Companies were not then represented, except that one speech was made on their behalf by Sir Edmund Beckett (now Lord Grimthorpe). The possibility of coming to a conclusion without hearing evidence was also contemplated last week by Mr. Littler, who thought the Committee might in that way adopt the Commission Bill. It so happened that the Committee did decide without receiving evidence; but the measure was rejected. The Chairman remarked that the governing words of the preamble were that "it is expedient to constitute a public authority "which shall represent the interests and command the "confidence of the water consumers." This was so much an echo of Sir W. Harcourt's dictum, that the Chairman declared "it would be quite ridiculous for the Committee "to take evidence upon that point." It is a settled principle with the Committee that the Companies are to be superseded. The question is how, and by whom?

Passing from the Commission Bill of the Corporation, the Committee proceeded at their next sitting, held on Thursday last, to hear the opening address of Counsel on behalf of the Metropolis Water Supply Bill, promoted by the Vestries. If ever there was a "Hybrid" Bill, this is one. While professing to create a "Trust" representative of the entire water area, it provides that the County Council may, by a resolution of their own, take the place

of the Trust, and exercise all the powers which otherwise would be wielded by that body. But the County Council demur to the Bill, seeing that it provides in a positive form for the purchase of the existing supply, and lays down a certain scheme of arbitration. A Bill framed on the one hand to do justice to the Water Companies, and on the other to do honour to the County Council, is in a somewhat awkward position. Rather than do justice to the Companies, the County Council would decline the honour. By-and-bye, supposing the second reading to come on in due time, the Select Committee will have before them the London County Council (Water Supply) Bill, in which it is proposed that the Council shall have power to bring in a scheme of their own. Power to introduce future Bills is for the present as vague with the County Council as it was with the proposed Commission. But there is this difference—the Commission had to be created; whereas the County Council, as a corporate body, already exists. The Vestry Bill is superior to both, in that it proposes a definite and immediate plan. If this Bill were to pass, something must be speedily done—that is to say, the Trust, or the Council in place of the Trust, must proceed at an early date to take such steps as will result in the purchase of the Companies' undertakings, and in carrying out such further works as may be required. It will be particularly interesting to see how the Committee deal with this Bill. It seems inconceivable that they can dispose of it without hearing some evidence, and that at considerable length. One weak point presents itself, and that is the question of money. Parliamentary warfare is expensive; and the process of "carrying round the hat" is not always successful. Some few hundreds are wanted to "pay the piper;" and should these not be forthcoming, the promoters of the Metropolis Water Supply Bill will be in the position of troops fighting a battle with their ammunition running short. It is also a little doubtful whether the Vestries and District Boards are legally entitled to spend the money of the ratepayers for the purpose of carrying a Bill through Parliament. There was a hope that the Government would take up this measure; but Mr. Ritchie has preferred to leave it where it is. That it will pass in its present form, is on more than one account most unlikely.

The Recent Further Issue of South Metropolitan "C" Stock.—Referring to the paragraph on this subject which appeared in the JOURNAL last week (p. 788), it should be pointed out that the sum then mentioned—£20,000—was, in round numbers, the nominal value of the stock, which, as afterwards stated, was issued at the price of £242 per cent. This makes altogether £32,000 of this stock, worth upwards of £76,000, which the Company have offered to their consumers in smaller quantities.

The Southern District Association of Gas Engineers and Managers will have their spring meeting on the 14th inst.; and, as usual, it will be devoted to an excursion. According to the programme which the Honorary Secretary (Mr. J. W. Helps, of Croydon) has issued, the Committee have arranged for a very pleasant outing, which will only require fine weather for its thorough enjoyment. The Royal Borough of Windsor is the place selected; and it will be reached (from either Waterloo or Paddington, according to the convenience of members) about midday. After an inspection of the gas-works, luncheon will be partaken of at the Star and Garter Hotel; and then St. George's Chapel, the North Terrace of the Castle, and other places of interest will be visited. In the afternoon, breaks will convey the party to Virginia Water; returning in time for dinner at the above-named hotel at six o'clock. The return train from Windsor is timed to reach town just before ten; so that the members and their friends will have a long day.

The Management of the Macclesfield Corporation Gas-Works.—We regret to learn that, owing to continued ill-health, Mr. T. Moore, Gas Engineer of the Macclesfield Corporation, has been compelled to send in his resignation. When, a short time ago, Mr. Moore began to feel unequal to his work, the Gas Committee granted him three months' leave of absence. This expired on Monday last week, when he attended before the Committee, and produced medical certificates showing that there was no real improvement in his condition, and that consequently he was unable to resume his duties. Under these circumstances, he tendered his resignation, and applied for twelve months' salary. The Committee thought they could not do otherwise than accept the resignation; and they voted him six months' salary, and, in addition, paid him for the month up to date. They also appointed Mr. H. H. Ford (who had charge of the works during Mr. Moore's long illness, and who has been engaged in this department of the Corporation for 16 years) Manager *pro tem.* Mr. Ford is a Macclesfield man; and there is good reason for believing that the action of the Committee will be confirmed.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 833.)

THE past week has been a short and light one for Stock Exchange purposes. The 1st of May is always a holiday; and business just now is scarcely good enough to make it worth while haunting Capel Court on an isolated Saturday. So the House closed on Thursday for the week. In addition to this, the important Hebrew section were otherwise engaged on the Wednesday and Thursday. So, altogether, the week was composed of two full days, two half-days, and two no-days. Business in general has thus been extremely limited; and nothing stirring occurred to effect any change worth noting in the position of the markets. The Directors of the Bank of England did nothing on Thursday, and left the rate unaltered for another week at least. The Gas Market shared the general reduction of business; but it showed no sign of languishing for lack of support. The changes which have taken place in quotations are of the slightest dimensions, and very few in number; and these are almost entirely confined to small undertakings whose movements can have but little if any influence on the general market. In Gaslights, the "A" has had its share of attention, at steady figures; being done at 243 on both the opening and closing days. The debenture, preference, and maximum issues have been more than proportionately active; but they showed no sign of moving either up or down. South Metropolitan afforded only a couple of transactions; but they were at satisfactory figures. Commercials were quite neglected. Among the Suburban and Provincial undertakings, the only one to attract attention was British, which was in good favour; the buying price going up 1. The Continental Companies were very lightly dealt in, at firm quotations. The other Foreign undertakings showed varying movements. The buying price of Bahia was 1 better; but Parà fell back ½, and Malta and Mediterranean receded ½. Sydney debentures also lost 1. In Water, there has been scarcely any business done; and there seems to be an appearance of a check to the run against the stocks. The few movements observable are irregular; East London being 1 better, and Grand Junction 2 worse.

The daily operations were: Light business in Gas on Monday; but pretty impartially distributed. Gaslights were steady and unchanged. British rose ¼; but Malta went back ¼. Water did not move. Tuesday was equally quiet; and, except that Continental Union realized top price, there was nothing remarkable about the figures marked. Water again presented no feature. On Wednesday, there were extensive dealings in Gaslight issues, all of which held steady and unchanged. Sydney debentures fell 1; but Bahia rose ½. Nothing at all was done in Water; but Grand Junction were put down 2. Gaslights again had most of the business on Thursday; the old quotations standing firm. Parà fell ½. A little business was done in Water, at very moderate figures; but East London recovered 1.

ELECTRIC LIGHTING MEMORANDA.

The Affairs of the Metropolitan Electric Supply Company—The Economical Use of Incandescent Lamps—Cost of Incandescent Lamps in England.

THE event of the week in electric lighting circles has been the meeting of the Metropolitan Electric Supply Company, which was held on Wednesday last under the presidency of Sir John Pender. The Company have spent £364,000 upon their undertaking, and announce that they have "turned the corner," so fas as to be warranted in paying an interim dividend of 2s. per share (£9 paid). Perhaps the fact that the remaining £1 will soon be called up on the shares, had something to do with this decision to pay a dividend on the basis of accounts showing a net revenue balance of £461 for the employment of this large capital. The balance appearing in the revenue account as earned by electric lighting was only £136. Naturally, as these accounts cover the first fifteen months of the Company's working existence, the Directors are able to claim a phenomenal growth of business. Thus we are told that while the income for the last quarter of 1889 was only £2866 for 14,000 lamps, for the same period of 1890 it was £10,726 for 48,000 lamps. To-day the Chairman puts the number of lamps in circuit at 60,000, and promises that by this time next year the tale will run up to 100,000 lamps. This remains to be seen. The Chairman directed much of his speech to criticizing the systems of supply adopted by other companies in the same line of business; maintaining, of course, that this Company's plan of alternating transformers, with the mains under a pressure of 1000 volts, is the best. Sir J. Pender gently stirred up his friend and rival Mr. J. S. Forbes; and he will doubtless be stirred up himself in his turn. Meanwhile, we take the liberty of remarking that a little more experience will be needed before it can be considered as proved that there is money in supplying West Central London with electricity for lighting purposes at the price of 7½d. per unit. Sir J. Pender declares that this is equivalent to a charge of 12s. per annum for every 8-candle lamp in private houses; but this is hardly Mr. Labouchere's experience, as discussed in this column last week. Moreover, we shall be curious to see how soon the

mushroom growth of this Company will experience that check which the Chelsea Company have already realized as imminent when the £200 a year houses have been gathered in. When the line of saturation of a lighting district has to be drawn somewhere about a rental value of £150, its possibilities are soon exhausted, even in London.

A pamphlet on the use of the incandescent electric lamp, by Mr. H. Ward Leonard, has been published by the Edison Company for the instruction of their customers. The principal object of this composition is to show purchasers and users of incandescent lamps in what the highest economy of such articles consists so that they may know what to look for in a really good and cheap lamp. It is stated, as a fundamental consideration, that lamps can be made by any manufacturer which shall have any required average life, if no rate of efficiency is fixed. The user of lamps of this kind is frequently and forcibly reminded of the cost of renewals, and is consequently led to believe that the cheapest lamp for him is necessarily that which has the longest life. This would be the case if current were always supplied on rental terms, and no questions asked by the supplying Company as to the quantity taken. When the supply is by meter, however, it is obviously desirable, in the consumer's interest, that the lamps he uses shall be efficient in converting electro-motive force into light, as well as fairly durable. Mr. Leonard argues that, in ordinary circumstances, the most economical lamp is that which takes 3·1 watts per candle, or (say) 50 watts for a 16-candle power lamp, and lasts on an average 600 hours. In order to compare on equal terms with such lamps, those having an efficiency of 3·6 to 4 watts per candle should be guaranteed to last from 900 to 1500 hours. This calculation is made on the basis of American practice.

The matter of Mr. Leonard's pamphlet is criticized from the English standpoint by the *Electrician*, which puts the case of a house wired for a number of lamps; the majority being of 8-candle power nominal, and the pressure in the service fairly constant at 100 volts. Given also the price of the lamp at 3s. 9d., and the charge for energy 7d. per unit, what is the best efficiency at which to run the lamps, or, in the case of Edison-Swan lamps, what is the best nominal voltage to choose? The lamp manufacturers reply that their lamps should be run at 4 watts per candle—that is to say, that 100-volt lamps should be used, wherewith the consumer gets about 36-candle power hours for a penny. If he uses 95-volt lamps, he will get about 20 per cent. more light; but the life of the lamps will be shorter. On the other hand, with 105-volt lamps there will be more than 20 per cent. decrease in the light, which will appear dull; but the cost of renewals will be very considerably diminished. Our contemporary observes that it ought not to be difficult to determine which of these conditions of lamp usage is best for the convenience and pocket of the consumer; but, unfortunately, in the absence of precise information respecting the actual performance of the lamps in common use, it does not attempt to make any such determination. It is admitted, on the one hand that the manufacturers' rating of 4 watts per candle may be the correct one; and it is not implied that the Edison-Swan Company would be likely to wilfully deceive their customers in regard to such an important matter. At the same time, it is remarked that the makers are not altogether the proper authorities from whom such a recommendation should come, seeing that they must always lie under the suspicion of not desiring to make lamps to last too long. Yet it is surely reasonable to credit such a respectable concern as the Edison-Swan Company with a recognition of the fact that it is not to their lasting interest to send out trumpery articles. At present British users of incandescent lamps have no choice in the make of these commodities, for the patent law has concentrated the trade in one firm. That this firm should have so interpreted their monopoly as to send out, under its protection, the best lamps in the world instead of the worst, is only what might have been expected according to the traditions of British trade. The trial will come when the master patents expire, when, instead of having to pay 3s. 9d. for an article known to be good, consumers will be offered for half the price lamps to which the maxim *caveat emptor* will fully apply.

Mr. A. Shires, Manager of the Biddulph Gas-Works, has been appointed, out of 65 applicants, to a similar position at Kidsgrove, in succession to Mr. J. L. Mitton.

Mr. T. Hands, formerly with Mr. Booth, as fitter and erector at the Southport Corporation Gas-Works, has succeeded Mr. Smith in the managership of the Enniskillen (Ireland) Gas-Works.

The Gaslight and Coke Company's Large Coal Contract.—We are informed that, in response to the recent application of the Directors of The Gaslight and Coke Company for tenders for the supply of 1,800,000 tons of coal (being a year's supply), 125 replies have been received, offering nearly 6,000,000 tons in all. Nothing is stated as to the prices at which this enormous quantity of raw material has been submitted; but our Newcastle correspondent, whose usual paragraph on the coal trade of his district appears in another part of the JOURNAL, says, "it seems to be the belief that the contract will be allotted at about 9s. to 9s. 6d. per ton, free on board."

PATENT RIGHTS AND WRONGS.

THE laws relating to patents for inventions of this and other countries constitute a subject of discussion which is never neglected for long by those classes of the community which are interested or engaged in mechanical and manufacturing industries. It is not very long since the Patent Office arrangements of the United Kingdom were reorganized; yet there is no finality about the views of patent law reformers, and within the past few days a question was addressed across the floor of the House of Commons to the President of the Board of Trade which raised a direct comparison between the patent systems of England and the United States. An honourable member compared the total cost of protection for an invention for the whole period permitted by the law in the two countries, which, of course, made a British patent appear a very costly privilege. On the other hand, the President of the Board of Trade was able to show that the cost of a British patent for three years over and beyond the period of provisional protection is considerably lower than the American price, and also that the absence from the United States patent system of any deferred tax, or other means of killing off unworked and unremunerative patents, is a grave defect. Attention has of late been directed to the United States patent system by the holding of a national celebration of the centenary of its establishment. This anniversary was intended to be a very grand affair. It lasted three days—the 8th, 9th, and 10th ult.—and the "exercises" were inaugurated with an address by the President of the United States. Orations constituted the principal entertainment of the assembly on this historic occasion; and although most of these were merely specimens of "spread-eagleism," there were a few useful practical papers read during the three days' assembly.

It is a trite observation that, in most of the contemporary developments in regard to which the United States differs from England, the source of the difference will be found to be French. In nothing American is the French spirit more apparent than is the complacency with which any established system is regarded by the people, and the indifference with which suggestions of the most obvious practical reforms are met. It is only for those interested in the maintenance of any local institution, such as the Tariff or the Patent System, to "orate" sufficiently, and the patient American people seem quite willing to believe what they are told concerning the absolute perfection of the system in question. The British trick of grumbling at everything, and incessantly tinkering away at every established system with a view to keeping it up to popular requirements, is apparently as foreign to the American, as it certainly is to the French spirit. The condition of the great American patent system is an example in point. Those who praise it in the extravagant way sometimes heard, know nothing about its practical operation. As a matter of fact, it is extravagantly costly to the country, if not to the patentees; and but that any excusable outlet for revenue is desired by the Federal Government, the working of the Patent Office would be speedily overhauled. The system of prior examination, of which apologists make so much, is utterly useless, since no guarantee is attached to it, and it only causes vexatious delay in obtaining protection, besides being very expensive. Then the absence of any machinery for removing merely obstructive patents has been already remarked. The "Official Gazette," again, which is so much overrated by defenders of the American system, is practically useless, since it only publishes the claims and a selected drawing or two, religiously repeating all the reference lettering without a word of explanation.

The British patent system is anything but perfect; but then nobody pretends that it is. The American system is full of defects; and it is considered treasonable to hint at the existence of a single blot upon it. There is a reasonable prospect in the United Kingdom that if any particularly glaring anomaly should be detected in our system, the Board of Trade would run through Parliament a short Amendment Bill with a view to setting matters straight. There is little or no opening for anything like this ready means of procuring reform in the American Federal system.

We in England have not yet been persuaded by Sir Frederick Bramwell, and by those who think with him in this matter, that patented inventions are absolutely unmixed blessings; and that to invent something patentable is the first duty of man. Indeed, the day of cheap patents in which we now live, has brought into prominence certain aspects of patented inventions which are not altogether pleasing to individuals or wholly subservient to the best interests of the community. Moreover, the cheap patent system is being worked for purposes which, if not exactly mischievous, are certainly not such as a patent system is primarily intended to serve. For instance, very often now-a-days patents are applied for purely as a style of advertisement. Almost weekly we may notice particular names appearing as applicants for, or recipients of, protection for small factory dodges which are intrinsically worthless. This order of patentees know full well that the technical journals devoted to the particular industry in which they are engaged must follow up the Patent Office publications; and so they get many an advertisement which more than pays for office fees. On the other hand, it is recognized that a patent is the best and cheapest form of publication open to professional men interested

in particular lines of investigation. They do not want to advertise themselves as the main consideration; but possibly they desire to draw attention to a special kind of apparatus, or to make public a certain device. This can now be done through the Patent Office for a comparative trifle; and there is the further advantage that, having been once published in this way, after three years the idea is open to the world, and can never be locked up in a later patent.

The facility with which patents can now be obtained is fostering a novel description of public nuisance—the patentee of "unconsidered trifles," several illustrations of whose vagaries have been recently brought to our notice. A visitor to (say) a gas-works, where it is generally understood that all sorts of experiments are usually in progress, thinks to pick up something that may help him to work out an idea which he has in the recesses of his mind, and is, of course, under no obligation to say anything about. He is shown everywhere as an act of courtesy, and sure enough sees the very thing he wants. He goes straightway and completes his patent; serving prompt notice on the people who have helped him to it that now the thing is his property, and he will expect payment of a royalty for permission to use the whole or any part of it. This is no fancy picture; the trick has actually been performed within our knowledge, and has had the effect of closing a particular works to visitors of a certain order.

Again, the patent outrage can be worked in this way: A business firm will patent a variety of construction which other people would regard as a trifle, or as common property. Thus, supposing it is a question of fitting coal-waggons or coke-barrows with paper wheels, to suppress rattle—which an enterprising gas manager might think himself perfectly free to do. No sooner is the contract out than, to the manager's disgust, some manufacturer of coke-waggons who has failed to get his tender accepted notifies to him the interesting fact that this particular application of paper wheels forms the subject of a patent which he (the manufacturer) has recently taken out, and upon which accordingly a royalty must be paid. Conceive the gas manager's disgust at such an attempt to forestall him! He may not be able to say offhand that he has ever seen the particular application in question actually used by anybody else; and he is not quite sure whether or not in the the eye of the law, it is a patentable novelty. So far as he is concerned, he would never have dreamt of patenting it; but he is not a law to anybody else. In the end, if he is a man of his opinions, he sticks to his idea, and tells his correspondent to do his worst; if he is not a man to "fight the bear," he quietly gives up the project, and pities himself as a victim of circumstances. Nine times in ten, the bold course is the best. The day will come when a man who is afraid overmuch of the patent law will not be able to build a gasholder, or make a tank, or charge a retort, or charge a purifier, without running the risk of being threatened by patentees of twopenny-halfpenny dodges of construction and arrangement. *Verbum sap.* The people who are guilty of this sort of mal practice can put this cap on if they please. They read the JOURNAL, and do not require us to refer to them by name.

Patents must necessarily be treated differently by traders and by designers of apparatus for personal use or for the service of their employers. There is yet a hazy impression upon the public mind—the remainder from an earlier state of things—that a "patent" article must somehow be better than one which cannot be so described. This superstition is fast dying out—thanks, mainly, to the indiscriminate traders who have worked it to death by dubbing everything they sell "patent," merely by way of excuse for their dearness. Until it is quite gone, however, it is clear that a trader has a perfect right to take what advantage of it he can, by patenting all sorts of things merely for the sake of being able to advertise them as such. Thus, for example, if a stove manufacturer discovers, in the ordinary course of business, that a "patent" stove is looked upon with more favour by purchasers simply on account of this designation, he can hardly be blamed for patenting anything and everything of this class which can be made to pass muster at the Office. This is a very different thing, however, from a patent for a method of constructing an engineering work, intended to restrict the liberty of designers, and make them ask permission of the patentee to be enabled to do their work in their own way. This is what we have styled a patent outrage; and it cannot be described in milder terms.

When a man has invented a new and improved way of doing anything, it is but right and reasonable that he should have at least the credit for the suggestion, and as much profit as the idea can bring him. But for a man to appropriate, by the complaisance of the Patent Office, a notion which is neither better nor worse than many others of the same class, or a device which is rather an alternative to ordinary methods than an improvement upon them, and to make this appropriation a means of tying the hands of designers who do not seek to captivate the market, but only to do their work after their own fashion, is a piece of impertinence that requires checking before it grows commoner than it is. It may be asked how the line is to be drawn in this regard between what is a distinct improvement and what is merely an alternative. But the distinction, if not easily defined, is easy to understand. If, for example, a gas engineer wishful to erect a gasholder is informed of a method whereby the work may be done at considerable saving of expense or of time, he may be willing to pay a reasonable proportion of the estimated saving for the privilege of using the new method, and will not object to it as being temporarily private property. Should he, on the other hand, propose, for his convenience, to make a change in the design which is of no particular advantage in itself, he will naturally be wroth when told that some gasholder maker has appropriated the idea, and will either grant him a licence to use it, for a consideration, or will graciously waive the claim upon securing the contract for the erection of the holder. This is the sort of thing that inclines people to ask whether, after all, a patent system is not of more harm than good to the public. The evil, as we have said, is a growing one; but it can be met by showing a resolute front, and daring buccaneering patentees to prove their right, which will generally frighten them off.

NOTES.

A New Decimal System of Weights and Measures.

A fresh contribution has been made towards the solution of the problem of the simplification of British weights and measures by Mr. C. J. Hanssen, of Copenhagen, well known in connection with the distribution of power by means of compressed air. Notwithstanding its obvious convenience for many purposes, the metric system makes little or no progress towards adoption by those countries which use the British foot as the working unit of length. For engineering purposes, the foot measure is a vastly more convenient standard than the metre, which is too cumbrous. Mr. Hanssen proposes to decimalize the British system, and to secure at the same time the advantage of a simple ralation between the unit of length (which determines volume), the unit of mass, and the unit of specific gravity. To this end he proposes to increase the length of the foot by about 1·250oth, or the thickness of a sheet of common writing-paper. In exact ratio, the alteration would be from 1·0000 to 1·000403. The pound avoirdupois, the ounce, and the imperial gallon would remain unaltered. By this infinitesimal alteration of the length of the standard foot, all existing standards of weights and measures would be converted at once into a decimal system. The new standard cubic foot would contain exactly 1000 ounces of distilled water at 4° C. Consequently 16 cubic feet would equal 100 gallons (called a hectogallon); and one hectogallon of distilled water at 4° C. would weigh 1000 lbs. The new foot might be subdivided into deci-, centi-, and milli-feet; and the gallon and pound might be similarly treated. The weight of one cubic decifoot of a substance in ounces, or the weight of a decigallon in pounds, would express its specific gravity. Mr. Hanssen argues that with his proposed system, numerous problems—especially in steam and gas engineering, and in dynamic, thermodynamic, and thermo-chemical science—which are now difficult tasks for eminent professors and masters in science, would become so extremely simple that practical men of ordinary education and capacity, and even clever schoolboys, would be able to comprehend and solve them.

The Fatigue of Metals.

With respect to statements that occasionally appear in prin on the subject of the fatigue of metals under long-continued stress, to which otherwise unaccountable accidents—such as the fall of gas-pendants, after hanging many years in perfect security—are referred, a report that has recently transpired regarding the comparative testing of two similar suspension-bridge links is worthy of notice. A square iron link, 12 inches wide, 1 inch thick, and about 12 feet long, was taken from a bridge at Kjeff, then about 40 years old, and tested against a similar link which had lain unused in store ever since the building of the bridge. The means of comparison were therefore *primâ facie* perfect, and the result should go a long way to show whether or not iron really does lose any of its strength in prolonged service. The effect of the tests was to determine for the old used link an ultimate tensile strength of 21·8 tons per square inch, an elastic limit of 11·1 tons per square inch, an elongation of 14·05 per cent., and a contraction of 17·35 per cent. at the point of fracture. For the unused link, the tensile strength was found to be 22·2 tons per square inch, with an elastic limit of 11·9 tons, and elongation and contraction at fracture of 18·42 per cent. and 18·75 per cent. respectively. The two pieces of iron were therefore of practically identical strength; for the small difference actually observed is well within the ordinary range of variability of similar pieces of the same metal. It is not stated what strain the used link had actually borne in the course of its existence as an integral portion of the bridge; but it may probably be assumed that, while it did its share of work, it was not strained beyond the limits ordinarily permitted, of (say) from 4 to 5 tons per square inch. This being so, it is satisfactory to learn, from this evidence, that the fatigue of the metal does not amount to anything worthy of notice. Of course, it would have been different if the link had ever been strained to near its elastic limit. It would then have become brittle, and have parted under a comparatively small strain, especially if accompanied by shock.

The Action of Non-Conductors of Heat.

An extensive series of experiments was recently carried out by Professor J. M. Ordway, then of the Massachusetts Institute of Technology, upon the non-conducting properties for heat of various substances employed for coating steam-pipes, lagging

stoves, &c. The line taken for these experiments was to place an inch thickness of the material under examination upon a flat iron surface kept heated by steam to 310° Fahr. The amount of heat transmitted per hour was reckoned in pounds of water heated 10° Fahr.; the unit of area being the square foot of surface covered. Professor Ordway remarks that still air is practically a non-conductor. The bulk of solid matter in the best non-conducting substances, such as loose wool or feathers, is relatively too small to have any specific effect, except to entrap the air and keep it stagnant. These substances keep the air still by virtue of the roughness of their fibres or particles. For this reason such materials as cork, charcoal, or loose lamp black, best slag wool, or fossil meal, are good obstructors of the passage of heat. Of course, the question of the inflammability of the material itself has to be considered, and also its liability, if loose, to shake together and then conduct heat rapidly. One description of asbestos tried, with smooth fibres, which could not prevent the air from moving about, gave a low result; and although later trials with asbestos of exceedingly fine fibre made a somewhat better showing, Professor Ordway concluded that asbestos is one of the poorest non-conductors. By reason of its fibrous character, it may be used advantageously for holding together other incombustible substances; but the less the better. The experiments with charcoal, lamp black, and coal dust proved that non-conducting power depends far less upon the nature of the substance itself than upon its physical condition or its mechanical texture. In some cases, packing the material thickly increases its non-conducting virtue, by rendering the included air more completely fixed. Any suitable substance used to prevent escape of steam heat should not be less than an inch thick, and must be kept dry, for even still water conducts heat about eight times more rapidly than still air.

Iron and Steel Institute.—The annual meeting of this Institute will be opened to-morrow morning at the Institution of Civil Engineers, under the presidency of Sir F. Abel, President of the British Association. From the long and intimate connection of Sir Frederick with the development of ordnance at Woolwich, his Inaugural Address is expected to deal largely with matters concerned with national defence. Several papers to be read will be upon kindred subjects; but one, by Mr. J. D. Weeks, of Pittsburg, will be devoted to the coke industry of the United States.

A Reference Library for the Incorporated Gas Institute.—We learn from a circular received from the Secretary of the above Institute (Mr. W. H. Harvey, B.A.) that the Council have decided on forming a reference library bearing upon gas and cognate subjects. Several donations have already been promised conditionally on the library being established during the current year; and assistance is invited to carry out the project. Contributions will be duly acknowledged; and if received before the end of June, will appear in the printed list of presentations in the volume of Transactions for 1891.

The Water-Works and Gas-Works Securities Corporation, Limited, of which the prospectus appears in another part of the JOURNAL, has been incorporated with a capital of £2,000,000, in 199,800 ordinary shares of £10 each, and 2000 founders' shares of £1 each, to deal in the shares, bonds, and other securities of water, gas, and other lighting companies, and to obtain concessions relating to such undertakings, especially in the United States and Canada. The present is an issue of 99,800 ordinary shares, for which subscriptions are invited by the International Trustee, Assets, and Debenture Corporation, Limited; and they will be entitled to a preferential dividend of 8 per cent. out of the profits of each year. The subscribers for the founders' shares have guaranteed £700,000 of the capital; and they will be entitled to half the remaining profits—the other half (subject to provision for reserve fund) being available for a further dividend on the ordinary shares. Only £1 per share is to be called up; the remainder to constitute reserve capital. It will be seen that upon the directorate are several gentlemen connected with London and provincial gas and water undertakings.

Mr. H. C. Burdett on the London Water Companies.—In the JOURNAL a few weeks since, we called attention to an interesting feature in the volume of Mr. H. C. Burdett's "Official Intelligence" for the present year, in the shape of a very important chapter on the London Water Companies. In response to a request from several quarters, Mr. Burdett has reprinted the chapter with an "Introductory Note" embodying the latest facts and particulars in regard to this subject; and it is published by Messrs. Effingham Wilson and Co., of the Royal Exchange. The issue of the pamphlet at the present time is a happy idea, as the valuable statistics it contains will doubtless be of service to those interested or professionally engaged in the great inquiry which was opened at Westminster last Tuesday. It is impossible to discuss here Mr. Burdett's figures. All we can say is he shows pretty clearly that the scheme of the late Mr. E. J. Smith was not only an able one, but one which would, if adopted, have resulted in very material gain to the consumers. However, the whole question is now, so to speak, *sub judice;* and it is to be hoped, as Mr. Burdett says in closing his "Note," that the result of the labours of the House of Commons Committee now sitting will be to place the water supply of London once and for all on a sound and satisfactory basis.

TECHNICAL RECORD.

THE BUENOS AYRES CO-OPERATIVE GAS-WORKS.

With the present issue of the JOURNAL, our readers will receive the second of the series of plans of the above-named works which, by the courtesy of Mr. G. E. Stevenson, M. Inst. C.E., from whose designs they were erected, we are in a position to publish. Last week we gave the general plan of the works. We now proceed to show the arrangement of their constituent parts.

Retort-House.

The retort-house is 213 ft. 8 in. long and 70 ft. wide internally. Its walls are 2 ft. 6 in. thick, and rise 31 ft. 6 in. from the floor-level to the springing of the rafters. In the centre of the house a basement was constructed 50 feet wide and 7 feet deep; its walls being built on a floor of concrete 1 foot thick. They were constructed of machine-made bricks in cement mortar, and were rendered outside to prevent the ingress of water. The concrete floor was thickened to 2 feet under the retort-benches; and the whole floor was rendered with cement 1 inch thick before commencing to build the walls of the basement and the benches. The latter were built up from the floor of the basement; and the charging-floor was formed of cast-iron plates carried on a staging of wrought-iron joist girders, which were supported on the wall of the basement, and built into the piers of the benches. Staircases were provided at either end of the retort-house for access to the basement; and an inclined tunnel was made, proceeding from the centre of the basement and opening into the yard, for the removal of the ashes and clinker.

The base mouldings of the chimneys and the corbels for supporting the caps were made in blocks of fine concrete, and hardened under water previous to fixing, as described in the specification, of which the following is a translated extract:—

Chimney Mouldings and Plinths.—The mouldings of the base and neck of the chimneys, as also the corbels of the caps, shall be made of concrete (No. 18),* formed previously in wooden moulds; the blocks being fixed in position with cement mortar. In this manner also the plinths of all the building shall be constructed. The blocks formed in concrete to be ultimately fixed after the construction of the buildings and after removing the scaffolding; and the contractor must leave the necessary recesses in the walls to receive the plinths.

Entrances and Window Openings.—The arches over the entrances and window openings shall be constructed of one or more rings of brickwork, according to their width; but all of them must be turned on wood centres made for the purpose, and having the exact curve of the arch. After removing the centres, the arches shall be rendered underneath for the whole thickness of the walls, except the arches of those openings that are provided with doors or windows, which shall only be rendered up to the frames.

Door Sills and Steps.—In the entrances to the manufacturing buildings (such as the retort-house, coal-store, purifying-shed, boiler-house, and chemical factory) the floors of which will be at the yard level, sills of cast iron shall be fixed, which will be supplied by other parties. In the exhauster-room, meter and governor rooms, stores, offices, and residence, the floors of which will be 1 foot above the yard level, sills of white marble 1½ inches thick shall be fixed; and each entrance shall be provided with a marble step 1 ft. 6 in. wide, projecting in front of the entrance. All the sills and steps shall be laid in cement mortar.

Floors, &c.—The floor of the retort-house shall be made of blue bricks (Staffordshire), provided by the Company. Below the bricks there shall first be laid a foundation of concrete (No. 16) 6 inches in thickness, and on this the bricks shall be laid on edge in cement mortar (No. 11). The floor of the basement shall also be made of blue bricks after the retort-benches are built; but as the concrete foundation is already laid, the bricks shall be placed on the cement rendering of the floor. The floors of the coal-store and of the purifying-shed shall be made of concrete with a foundation of broken bricks. The foundation to be 4 inches thick, and the concrete 4 inches thick, to be finished with 1 inch of fine concrete (No. 15), making a total of 9 inches. In the exhauster, meter, and governor rooms, the floors shall be made of mosaic tiles, of a pattern approved by the Engineer. The tiles shall be laid in cement mortar (No. 12), on a bottom of fine concrete 2 inches thick, first making a foundation of broken bricks. In the lavatory and photometer rooms, the pump-room, and the stokers' rooms, common red tiles shall be used, also laid on a concrete foundation. The floors of the boiler-house and of the sulphate factory shall be made of blue bricks, the same as the retort-house.

Roofs.—The iron roofs will be erected by other parties; but, when erected, the contractor shall cover them with pitch pine boarding 1¼ inches thick. The boards shall be 6 inches wide, and shall be planed on the under-side, and matched and beaded. Before laying the boarding, bars of 3 in. by 1½ in. pine shall be attached to the iron purlins of the roofs by screws ¼ inch thick, and the boards shall be nailed down to these. Above the

* The numbers in parentheses refer to the list of some of the materials and mixtures stipulated to be used in the building contract, as given in the JOURNAL last week.

boards shall be laid the French roofing-tiles, on laths nailed to the boards for the purpose.

Retort-Benches.

The retort-benches were disposed in four batteries, each containing eight single beds of eight retorts each, built back to back. Two of the batteries communicate with one chimney situated between them, and the other two with the other chimney, also situated between them; there being thus two sections, each comprising two batteries, with their appropriate chimney. Below the charging-floor the piers of the arches are 2 ft. 3 in. thick, while above it, in the beds themselves, they are 18 inches thick. The arches are elliptical, built in three rings of fire-bricks, and having a width of 8 ft. 6 in. in the clear. The total number of retorts is 256; they are of ⊓ section 21 in. by 15 in. and 9 feet long inside. The generators are contained within the beds, and the regenerating flues are disposed on either side of the generators. The waste gases are finally taken under the ash-pans, which are of welded wrought iron. The uptake flues are constructed in the back division-wall between the beds, and there are separate main flues for either side of the benches. The furnaces are cleaned from below in the basement.

The contract for the construction was executed by Messrs. Gibbons Bros., of Dudley, who supplied all the materials, and erected the benches complete. The contract price was £16,000; but about half of this was absorbed by the expense of transport and delivery of materials. The actual cost of the settings was therefore, more or less, £250 a setting, or little more than £30 per mouthpiece, without fittings.

The arrangement of the retort-house connections is such that the gas is collected by four distinct mains, 12 inches in diameter, each serving for one-half of each section, and conducted into a wrought-iron main 24 inches in diameter, which is carried on brackets round the retort-house walls. This main is laid level, and the tar condensed in it is taken off at numerous points, and falls into syphons situated in the floor of the house, whence it is collected and removed to the tar-tank. The gas passes from the 24-inch main through 18-inch connections to the annular wrought-iron condensers. Each retort-setting is provided with a separate hydraulic main which is connected by a valve to the collecting-main.

The plate to appear next week will show the end view and transverse section of the building above described.

Mr. J. Birch Paddon, M. Inst. C.E., for many years Engineer and Manager of the Brighton Gas Company, and now Consulting Engineer to the Company, the Southampton Gaslight Company, and other similar undertakings, has been appointed on the Board of The Gaslight and Coke Company, in place of the late Mr. Stephenson Clarke.

The Folkestone Town Council and the Gas Company.—The contest between the members of the Folkestone Town Council, as to the advisability of pursuing the Gas Company in a Court of Arbitration on the question of whether the Company could not be made to lower their charges for the gas supplied for the public lighting of the borough, has, after much debate—more or less wise, but never brilliant—ended by the Council revoking their instructions to go to arbitration, and passing a resolution that in future they will cause to be inserted in their lighting contracts a clause to the effect that the price of gas shall be the same to the public as to private consumers, so long as a maximum of 4s. 6d. per 1000 cubic feet is not exceeded.

North of England Gas Managers' Association.—In the course of Mr. W. Hardie's reply to the remarks on his paper at the recent meeting of the above Association, as reported in the JOURNAL last week, he referred to the production of 26 lbs. of sulphate per ton of Durham coal. By inadvertence, the credit for this exceptional make was given in our report to Mr. Ford, of Stockton, instead of to Mr. Bower, of West Hartlepool, who, it may be remembered, was incidentally alluded to by Mr. Hardie in his paper. While making this correction, we may take the opportunity of mentioning that the high yield of sulphate recorded at West Hartlepool—the highest in the county of Durham—is due entirely to the very efficient modern plant recently erected by Messrs. R. and J. Dempster, of Manchester.

Mr. Wigham's New Lighthouse Burner.—In the House of Commons last Thursday, Dr. Cameron asked the President of the Board of Trade if his attention had been called to the new lighthouse gas-burner lately introduced by Mr. J. R. Wigham (*ante*, p. 737), and stated to have twice the intensity of the most powerful lighthouse burner tested by the Trinity House at the South Foreland; and also if he would have the new light, with the lenticular apparatus accompanying it, tested against the most intense form of electric light, with its most recent improvements, with the view of ascertaining their relative efficiency in fog. Sir. M. Hicks-Beach confessed that the apparatus alluded to had not been brought under his notice; and he reminded the honourable member that it was not the province of the Board of Trade to take the initiative in these matters. He said he had not had any application for a renewal of experiments from any of the general lighthouse authorities, who appeared to be satisfied with the exhaustive report a Committee of the Royal Society made a short time since on the subject of lighthouse illuminants.

OHIO GASLIGHT ASSOCIATION.

The Seventh Annual Meeting of this Association was held at Zanesville on the 18th and 19th of March, under the presidency of Mr. C. R. Faben, of Toledo.

In the course of his Inaugural Address, the President insisted on the importance of managers not only joining Gas Associations, but assisting them by attending at the meetings, contributing papers, and taking part in the discussions. On any subject that occupied the attention of the meeting the expression of opinion should be full, free, and complete. Looking at the advance made in other directions, the gas industry must keep pace with the times; and it was needful for every member to be unceasing in his efforts to improve the quality and reduce the price of his gas, and at the same time find the best markets for his products. The question of the municipal ownership of gas and electric light undertakings was exercising a great deal of attention, and no doubt every member possessed a decided opinion about it; but he did not believe that any advantage would follow a declaration on the subject by the Association. They were in no sense moulders of public opinion or a factor in politics; and the less of outside matters they attempted to discuss, the better. The question of fuel gas was progressing favourably; but the use of gas-engines as small domestic motors did not advance as they could wish. The electric motors possessed a strong advantage in not requiring a heavy foundation; and a number of them could be employed in one building, the wires being carried to each—thus saving the expense and waste of power consequent upon the use of belting, shafting, &c. Referring to the World's Fair to be held at Chicago in 1892, the President recommended that delegates should be appointed by the Association, to co-operate with those already named by the American, Western, and New England Associations, so as to form one General Committee. The electric light would be thoroughly represented; and the gas appliance department should be entirely creditable and beneficial to all.

Mr. H. W. Douglas read a paper on "The Proper Handling of Oxide of Iron in Purification." He said that the boxes must be of sufficient size to allow the gas to flow through at a slow speed; and the material should present as great a surface as possible to the gas, and give a minimum back pressure. Mr. Forstall had treated these points very thoroughly in the case of lime, in his well-known paper read before the American Association in 1875. He had no experience with artificial oxide, made by treating iron turnings or filings with solution of green copperas; but it was obvious that the best results would be obtained when the iron was very fine, and rusted in the presence of sawdust, so as to deposit oxide thereon. This could be secured with the natural oxide by having it finely ground, and thoroughly mixed with damp sawdust. The sawdust would thus be coated with fine particles of oxide, giving a large surface of contact for the gas. Coarse sawdust obtained from soft wood cut across the grain, was preferable. He showed by a table, comprising the results of actual observations, that when the vessels were of ample size, the quantity of gas purified per bushel was not very much less in winter than in summer; but when the boxes were small, the duty might vary to an extent inversely proportionate to the increased make of gas. In reference to water-gas works, he illustrated the necessity for uniform velocity by instancing two establishments worked with similar plant and materials, one being provided with a relief holder between the generating and the purifying plant, which enables a constant velocity to be maintained in the purifiers. By this means a duty of 6000 cubic feet of gas per bushel was obtained, against only 4000 cubic feet without the holder, though the mean velocity was greater in the first case. The lid should be raised and the material allowed to remain undisturbed for some hours, when the purifier was to be emptied, so as to allow ammonia and such like volatile matters to escape. This might be assisted by removing the middle screen in each layer. The material should be turned, during the act of revivification, and a sufficient stock kept to allow it ample time before being used again.

Mr. Christian commenced the discussion by asking for information on the subject of oxide of iron that would not revivify. He said he found that sometimes it became clogged with oily matter, and would not lose its black colour at all. Was there any way of getting rid of the oil without injuring the material? He would also like to hear from someone who had admitted a sufficient quantity of air with the gas to keep the oxide in working order. Mr. Hammond said that at times his oxide seemed to be sluggish in coming round; and in that case he sprinkled it with copperas solution, with good effect. He had not been successful in passing air with the gas. His coal contained 4 per cent. of sulphur; and so much air was needed that it reduced the illuminating value. But he had been fairly successful in blowing air and steam through the boxes when they were shut off, and thus saving the expense of emptying and refilling. Mr. Hayward, of the Conelly Iron Sponge Company, New York, said that a common mistake was to spread the oxide too thin when it came out of the purifier. A heap about 2 feet thick would come round better than a layer of a few inches, as it would heat a little, and the volatile oily matters would be driven off. He also recommended that oxide should be kept under cover, and not exposed to the weather. The instructions he sent out were to spread the

oxide for revivification about the same thickness as it was used in the purifiers; but this was on the assumption that it should be at least 18 inches, and not about 6 inches thick, as some seemed to use it. The thicker layer would give better results. It was most important that all tar and oily matter should be removed from the gas before it reached the oxide; and a thin layer of sawdust, breeze, or even of spent lime might be spread on the bottom layer of screens for this purpose. Mr. Thomas said he had lately heard of a case in which a layer of small coke, covered with bagging to keep the oxide from falling through, was successfully applied as a remedy for excessive back pressure. Mr. Bate used fine breeze on the lower tray, with bagging, and two layers of oxide—one 2 feet and the other 18 inches thick. The breeze was cleaned out about once a month. By adding copperas solution, the activity of the oxide could be retained until at last it became too heavy and had to be thrown away. On one occasion he left the oxide in a heap too long without turning, and it became red hot; so that while he believed in not spreading it too thinly for revivification, he had it watched to see that it did not heat too much, and it should be put where it could not set fire to anything. Mr. Faux found that the best plan, when the oxide was thrown out, was to let it lie about 4 feet thick and get hot; but, of course, not hot enough to burn. After this it was spread out a foot thick, and turned some three times with the shovel. He used breeze or sawdust on the bottom tray, to keep out oily matters, and filled in the oxide on that to a depth of 28 inches in one layer. When the oxide gave trouble by caking, he mixed scrap tin with it. Mr. Printz said that he had repeatedly tried to use oxide, but without success, although the size of his boxes was above the average. After trying everything that experience could suggest, he was forced to conclude that the failure was due to some peculiarity in the coal. He wished he could use it, as labour and lime cost him upwards of 3d. per 1000 cubic feet of gas. He was using a coal containing 3 to 5 per cent. of sulphur; and the difficulty was that the oxide would not take up the sulphuretted hydrogen. A foul test soon showed at the purifier outlet. Mr. Phillip described his revivifying-shed, which was fitted with sliding doors that could be opened in summer and closed in winter. A number of hot-water pipes were carried round, so as to keep the oxide from getting too cold; and he found that the warmth greatly assisted revivification. He laid the oxide out about 2 feet thick, and turned it every day. It was half that thickness in the purifier. He had also experienced great difficulty with oily matter. The boxes were 10 feet square—three used for oxide, and one for lime; and his average make of gas was 110,000 cubic feet per day. He charged a purifier about once a week. Mr. Clapp preferred fine shavings or chips to sawdust for mixing with oxide; and he emphasized the importance of sufficient condensation. The Secretary (Mr. Irvin Butterworth) used grindstone grit, which he said could be had in his neighbourhood for 6s. per waggon-load, without any sawdust or other admixture; and it answered well in every way, and was quite equal to the natural oxides. The President said that if the material were too rich in iron, it would be particularly liable to fire after the purifier-lid was raised. At present he used not more than 60 per cent. of iron turnings and very coarse sawdust, which was a bad conductor of heat. As the result of experience, he had adopted the rule of 94 parts by measure of coarse sawdust to 6 parts of iron turnings, wetted down with a saturated solution of copperas. It did not answer so well the first time of using as afterwards. His boxes were 16 ft. by 24 ft. by 3½ ft. deep; and the fouled contents of one of them were barrowed out into the yard, heaped in pyramid form, and left to revivify. He used enough iron to produce under these circumstances a moderate warmth, but not excessive heat.

A brief interval that occurred at this stage was filled up by resorting to the question-box. In reply to an inquiry as to the best paint to be used for the sides of purifier-lids, Mr. Printz recommended crude oil. He put a layer about ¾ inch thick on the surface of the water in the lute, and occasionally smeared a little on the lid with a brush. The Secretary recommended a mixture of grease and graphite as a useful preservative for ironwork exposed to damp or corrosive fumes. Mr. Cantine thought nothing was better than coal tar and turps for ironwork, or than Mr. Printz's plan for the purifier-lids.

On the subject of "Which is the best method of condensation—the open-air or the water system?" Mr. Thomas said that he preferred the former, and he insisted on the importance of very slow cooling, and a temperature of not below 60° Fahr. at the outlet. Mr. Harbison believed in a large and long take-off in the retort-house, and slow and gradual condensation. The water apparatus, he said, had the advantage that it could be made independent of atmospheric variations. Mr. Clapp preferred open-air condensers, as effective, simple, and cheap, after having had experience with both systems in five different works. In reply to a question, Mr. Thomas gave examples showing that sudden reductions of temperature in the condensers led to naphthalene in the gas. The subjects of "How to avoid trouble from carbon in the retorts," and "What is a proper allowance for unaccounted-for gas?" were also discussed.

Mr. G. Osius, of Detroit (Mich.), read a paper entitled "How a Small Works can Profitably Utilize its Ammoniacal Liquor." He commenced by describing the usual means employed for storing liquor, and getting up its strength by pumping it through a scrubber. Where no means of storing liquor existed, it would, he said, pay well to provide them, even in works so small as to carbonize only 750 tons of coal per annum. The advantage of further concentrating the liquor at the gas-works was next referred to. It was stated that in the first place it enabled large quantities of water to be used for the removal of the last traces of ammonia, &c.; and, secondly, it reduced the product to a much more portable form for carriage. He exhibited a sample of concentrated liquor of 60-oz. strength.

The Secretary inquired if a sulphate plant needed more care and attention than a concentrator. He said he had concentrated his liquor, and found that the escape of sulphuretted hydrogen caused such a nuisance that he had to put up oxide purifiers to absorb it. Mr. Clapp thought the chief question was the price that could be obtained for the concentrated liquor. Mr. Cantine said it was doubtful that the price of ammonia would keep up if managers of every gas-works, large or small, took to saving the liquor for sale. Mr. Harbison said he had for the past three years concentrated his liquor by a simple and inexpensive process, which might be adopted with advantage at any gas-works carbonizing 250 tons of coal or upwards per annum. As for the financial part of the question, he might say that his contractors had voluntarily raised their price 35 or 40 per cent. within the previous few weeks; and this showed that the demand for ammonia was increasing. He heard that at Altoona the liquor realized 10d. per ton of coal carbonized. The Secretary thought he did better than this, and obtained about 1s. Mr. Humphreys said he had had a large experience in concentrating, and also in making aqua ammonia, and was now devoting his attention entirely to the latter, as it was largely in demand for mills, druggists, and household use. He bottled it, and advertised it freely; and he was now doing all the trade for aqua ammonia in his town and neighbourhood, and also supplied wholesale dealers in other cities. While he did not consider it would pay gas companies as small as 750 tons capacity to go into the aqua ammonia business, he certainly thought they could concentrate with advantage. Of course, it was possible that in some places the freight charges would swallow up the profits. He was getting 40 lbs. of aqua, or 25 gallons of 10-oz. liquor, per ton of coal carbonized.

Mr. Osius, in replying, said it would be safe to calculate on having from 20 to 25 gallons of 8-oz. liquor per ton of coal. The process of making sulphate was more complicated—calling for the use of acid, which was not nice stuff to deal with; and he was decidedly of opinion that it required more care and attention than concentrating. There was a foul-smelling residuum from sulphate making, but not from concentrating, which could be conducted without causing the nuisance complained of. The only residual was a quantity of inodorous liquid. Assuming that every care was taken in collecting all the ammonia, the profit to be derived from it was, of course, greatly affected by local circumstances, cost of freightage, &c. The latter item was not so important in the case of the concentrated liquor, as he had observed. Any steam-pump made of iron could be used for pumping the liquor. There must be no brass about it, as the liquor would act upon it.

(To be continued.)

Mr. Grafton's Article on "The Standard of Light."—We regret that in making up p. 790 of the last number of the JOURNAL, the illustrations A and B in Mr. Walter Grafton's article, on "The Standard of Light," were accidentally misplaced; the flame marked A being that of the candle B in the diagrams, and *vice versâ*. The mistake has doubtless been noticed by most of our readers, seeing that the curvatures of the wicks in the transposed illustrations do not agree with the diagrams above, or with the text. Others, who have not yet perused the article, will perhaps note this correction when doing so. The remainder of Mr. Grafton's communication—including the tabulated results of the large number of tests he carried out with different photometers and with candles having their wicks in various positions—is in type; but it is unavoidably held over till next week.

Mr. C. C. Carpenter on "Modern Coal Gas Manufacture."—At the meeting of the Society of Engineers at the Town Hall, Westminster, last night, Mr. C. C. Carpenter, Assoc. M. Inst. C.E., of the Vauxhall station of the South Metropolitan Gas Company, read a paper on "Modern Coal Gas Manufacture." The author commenced by saying that upwards of 10 million tons of coal were carbonized annually for gas-making purposes in the United Kingdom. The subject of carbonizing was dealt with; reference being made to the shape of retorts best adapted for the purpose, as well as the most suitable settings of them and their construction—the relative advantages of "moulded" and "brick" or "tile" retorts being also considered. The various modes of heating retorts by direct or gas furnaces was next explained; the author giving a description of the system of multiple-heated settings introduced by him in 1886, and described in the JOURNAL at the time. Charging machinery and inclined retorts were next touched upon, as well as other details of retort-house working. The measuring and storing of the purified gas were explained, as was also the development of the large type of modern gasholder, with cantilever framing, originated and perfected by Mr. George Livesey. This led to a reference to the spiral system of guiding gasholders, with which the paper concluded.

REGISTER OF PATENTS.

Photometers.—Greene, W. F., of Piccadilly, W., and Varley, F. H., of Newington Green Road, N. No. 4622; March 25, 1890. [8d.]

This invention relates to a photometer, in which both the standard light and the light to be measured are placed at the same distance from the screen on which they are to be balanced, and are simultaneously projected through separate variable apertures made in opposite rotating discs, adjusted during rotation until the amount of light from the one source passing to the screen through one aperture balances that from the other source passing thereto through the other aperture; the comparison being made by the respective lights reaching the screen, or by shadows cast by such lights thereon. The lights or shadows (in consequence of the standard light and the light to be measured being placed at the same distance from the screen) are of equal size; so that their luminosity or density respectively when balanced is the same for equal areas. When the lights are thus balanced on the screen, the angular values of the respective apertures determine the respective values of the lights, and are directly indicated to be read off.

Two opposite rotary discs or shutters are used, one or both of which may be peripherally graduated, and each is formed with separate apertures at different radial distances from its axis of rotation. The apertures preferably are two in number, each semicircular in extent, and arranged with their diameters at right angles to each other. The discs are mounted side by side (but not in contact) on separate shafts, with their axes of rotation coincident, and their respective apertures in opposite or coincident pairs as regards their radial distances from the axis. They are, however, so arranged that one of the coincident pairs of apertures is open to its full angular extent (say, a semicircle, as aforesaid) at such time as the other pair of apertures is completely closed.

The discs are combined with a pair of collimators, funnels, or other suitable means of projecting the lights to be measured on to the screen on which they are to be balanced; such devices being so arranged relatively to the discs as to project the lights through the different coincident pairs of apertures on to the screen. The discs are also combined with means for rotating them at differential speeds, or at the same speed, at the will of the operator. In the former case this is for the purpose of causing one of the discs to advance on the other an equal amount at each revolution, whereby both such opposite or coincident pairs of apertures are caused simultaneously to have constantly varying angular openings admitting the passage of the respective lights alternating with constantly varying closed segments. This prevents the passage of such lights. One such angular opening increases or decreases in the ratio of the decrease or increase respectively of the other; while the following dark or closed segments respectively correspondingly decrease and increase or increase and decrease in the like ratio.

The discs are driven at such a speed as to cause the angular openings of their apertures to appear (owing to the phenomenon of the persistence of vision) when light is passing through them, as concentric luminous bands, the relative luminosity of which is dependent upon the amount of light passing through the respective openings. The amount is dependent upon the relative angular extents of such openings and of the following closed segments; so that, when the apparatus is driven at its proper speed by the differential gearing, the bands will appear of constantly differing relative luminosity due to the constantly varying amounts of the angular openings of the apertures and of the following closed segments. Thus the amounts of light projected from the sources of light through the collimators or other equivalent apparatus, which pass through the apertures to the screen, will be directly proportional as the angular extent of one of the openings is to that of the other.

The apparatus is continued in motion until the lights or shadows projected upon the screen are balanced, when the differential gearing is disconnected from the discs, and the motion of the apparatus is stopped.

Gas Motors.—Melhuish, A. G., of Denmark Park, S.E. No. 5192; April 3, 1890. [8d.]

In carrying this invention into effect, the patentee proposes to employ means analogous to the compounding of steam-engines; but with a relatively greater economic effect in the gas-engine so arranged.

Two cylinders are fitted side by side or one above the other; and a port or passage is provided from one to the other, so that it is operated by a valve, which closes the port at the same time that one of the cylinders is open to the exhaust—the motion being synchronous. Each cylinder is provided with a trunk or other piston, connected to a crank. The two cranks, on separate shafts supported in bearings upon the bed plate, are arranged so that one is approximately twice the stroke of the other. It is preferred to attach the fly-wheel to the crank-shaft whereof the stroke is least, and to attach the driving-pulley, or other means for transmitting power, to the other shaft. The relative motions of the unequally cranked shafts are caused to correspond by means of geared wheels or other equivalent device, whereby the ratio of the speeds is about 2 to 1. Consequently one of the pistons makes two out-strokes and two return strokes to one double stroke of the other piston. The position of the two cranks is such that both are in the position of half stroke at the same time; in other words, they are both at the point of highest efficiency. Following the relative movement of the two cranks geared in this way, when the short crank, or that with least stroke, is right back to the end of its stroke, the other crank, of greater stroke, is approximately 22½° advanced upon its outward stroke. At the portion of the stroke of the piston corresponding to this, the igniting device is arranged, which explodes the mixture of gas and air or hydrocarbon vapour and air which has previously been forced into this cylinder by the back stroke of the piston connected to the shorter of the two cranks. It is an essential feature of the invention that one of the cylinders so arranged acts as a motive power chamber and a pump alternately; while the other acts as a motive power chamber only. Thus the mixture is drawn in by one piston, and exploded behind both; the port of communication between them being kept open. The igniting device is opened to the mixture by the travel of the pistons only. Thus any premature explosion is obviated; and the action of the gearing between the two shafts is such as to cause both cranks to be in the best position for receiving the impulse, and transforming it into rotary motion with the least degree of loss.

The cycle of operations is as follows: The cylinder that performs the functions of a pump draws in a mixture of gas and air through an automatic valve; the port or passage of communication between the two cylinders being closed. The piston within the motive power cylinder is now upon its instroke—expelling the products of combustion resulting from the previous explosion through the exhaust port, since the port of communication is closed at the same time that the exhaust is open to the motive-power cylinder, and *vice versâ*. The piston in the cylinder, acting as a pump, on its instroke pushes the mixture previously drawn in into the motive-power cylinder when the port of communication is open, which occurs when the pump-piston is half way advanced on its return stroke. During the other half of the return stroke, the motive-power piston is moving upon its outstroke, and the crank in connection therewith has reached approximately 22½°. Then the igniting device is opened to the mixture behind both pistons; the pump-piston, owing to the arrangement of its cranks and gearing, having now commenced its second outstroke, which is completed by the time that the motive-power piston has moved the crank corresponding thereto to a point approximately 22½° from the end of its stroke. The return stroke of the pump-piston forces the products of combustion resulting from its individual explosion into the motive-power cylinder; the return stroke of the piston of the latter completely expelling them by way of the exhaust as already described.

It will thus be seen that this way of compounding a gas-engine allows of a single charge of gas, necessary to vitalize the volume of air drawn in, to act upon two pistons, one of which is in the most favourable position for receiving an impulse, and transmitting the power thereof as rotary motion with least loss, while the other piston is actuated immediately afterwards. The power is taken from the shaft which receives an impulse at each revolution; and it is materially assisted (and uniformity and regularity of motion procured) by the stored momentum of the fly-wheel, which revolves at twice the rate of the power shaft, and receives an independent impulse once in two revolutions.

Production of Water Gas.—Blum, J., of Berlin. No. 5239; April 5, 1890. [8d.]

To carry out this invention, the patentee proposes to inject into a closed vessel of suitable material and construction containing metallic plates, metallic sieves, pieces of metal, or metal in the form of grains of powder (and which, with its contents, has been heated to a suitable degree), a mixture of water and petroleum or some other hydrocarbon. The fluids are mixed in definite proportions; and the quantity of the fluids which enter the vessel in a given time is so commensurate to the source of heat, that the temperature of the vessel and its contents does not become reduced below a certain degree. Mutual decomposition of the fluids takes place, and results in the instantaneous production of water gas.

The hydrocarbon used for preference is crude petroleum; and the metal, nickel, cobalt, or copper. To produce the most economical results when generating gas, says the patentee, the following conditions are necessary: (1) The water and petroleum must be intimately mixed. (2) The quantities in the mixture must be in the chemical proportion required for their mutual decomposition, or very near it. (3) The metal must be maintained at a temperature, when nickel is used, of not less than 570° Fahr.; when cobalt is used, of not less than 630° Fahr.; and when copper is used, of not less than 850° Fahr.

Gas Motor Engines.—Seage, E. and F. T., of Exeter. No. 8431; May 31, 1890. [8d.]

This invention relates to motor engines of the kind in which a piston in a cylinder is moved by the pressure resulting from the combustion of a mixture of air and inflammable gas or vapour admitted into the cylinder or compressed therein. In such engines it has been usual to employ a shaft running at right angles with the crank-shaft, and driven by gearing at half speed; this shaft being used for the purpose of operating the slide or other valves for the admission of the combustible charge ignition and the expulsion of the same. By this invention this shaft is dispensed with, as well as the friction thereof, by substituting levers, fulcrumed at the centre, and operated by cams attached to the boss of a cog-wheel, driven at half-speed by a pinion on the crank-shaft. The other ends of the levers operating the valves are contained in a suitable chamber for the admission of the combustible gases and the expulsion of the same, as also an arrangement for governing the speed of the engine.

Valve Gear for Gas-Engines.—Vogelsang, O., of Plauen, and Hille, M., of Dresden, Saxony. No. 10,642; July 9, 1890. [8d.]

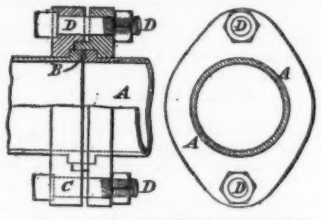
This invention consists in the combination, with the gas admission-valve of a balanced lever, oscillated in one direction by the engine and in the other by gravity, and through whose medium the operation of the admission-valve is so controlled that the latter will be opened or not at every stroke of the slide-valve according as the engine runs at the ordinary or at an excessive speed.

The mechanism is constructed as follows: Opposite to the stem of the admission-valve, and at some distance from it, is arranged a reciprocating finger, moving in a line with the stem and synchronously with the slide-valve. By the side of these parts is placed a lever capable of oscillating by gravity, and carrying a moveable pin controlled by a spring; the lever and pin being so disposed that, when the lever is in a certain position (its operative position), the pin will be lengthwise between the stem of the admission-valve and the reciprocating finger. The pin has such length that, under these conditions, the finger will, on advancing, press the pin against the valve-stem, and thus open the valve; the pin being pushed backward again by its spring when the finger recedes. Sideward of the lever there is an oscillating or reciprocating tappet, which, at every stroke of the slide-valve, acts on the lever to oscillate it, so as to throw the pin out of line with the admission-valve stem and the reciprocating finger. The lever is, however, balanced in such a manner that, when the engine runs at the proper speed, the lever, after having been swung out of its operative position, will return just in time to be again acted upon by the reciprocating finger at its next forward stroke.

The admission-valve is in this case opened at every stroke of the slide-valve. But, if the speed of the engine is too great, the lever will, on oscillating backward, be too late for the pin to be engaged by the reciprocating finger; and the admission-valve will consequently remain closed, and the cylinder will not receive any charge of explosive mixture. This skipping of charges continues until the engine has resumed its normal speed, whereupon the admission-valve is opened again regularly.

Pipe-Joint.—Aird, J., of Tipton. No. 16,896; Oct. 23, 1890. [8d.]

This invention relates to a joint or coupling for metallic pipes or tubes consisting of a fixed flange or collar upon each of the lengths of pipe to be connected; a ring of packing material interposed between such flanges; two loose clamping collars abutting against the flanges of the tubes; and means for forcing the clamping collars together.



The illustration shows a longitudinal view partly in section, and an end view of two lengths of pipe or tube united by means of this invention.

A represents portions of two lengths of pipe, upon the exterior of the meeting ends of which is formed a broad flange or collar, and in the adjacent or meeting faces is an annular channel or groove, in which is placed a ring of asbestos or other packing B. Upon each length of the pipe is a loose clamping collar C, which takes an abutment against the collar or flange of its respective length or section; and at suitable positions around the clamping collars holes are formed for the reception of headed bolts D, which at their opposite ends are threaded and fitted with nuts, which bear against the face of the clamping collar, and by the aid of which the clamping collars, and consequently the two lengths of pipe, may be forced together so as to tightly compress the packing between them. One of the clamping collars is formed with an annular flange on it, which covers the joint formed by the adjacent or meeting faces of the flanges or collars of the two lengths; and thus renders it impossible for the packing to blow out; while the clamping collar is recessed or formed with a shoulder, which takes the necessary abutment against the flange or collar of the tube. The other clamping collar is formed with an annular recess, so that it will receive and overlap the flange of the clamping collar, and thus form a broad bearing to these parts, and efficiently guide them in their movements. Upon screwing up the nuts, the meeting faces of the collars will be forced together thereby, compressing between them the ring of packing lying within the grooves or channels; and the clamping collars will cover the joint, and firmly bind the parts together so as to make a tight joint capable of withstanding great pressure.

By these means the patentee claims to be enabled to dispense with the screw coupling hitherto employed for joining together two lengths of pipe; and by reason of the elements of his coupling being of a very simple character, and therefore easily produced, he attains the desired end at considerably less expense. Another important advantage of the invention is that two lengths of pipe may be coupled in a much shorter space of time than by the screw couplings hitherto used.

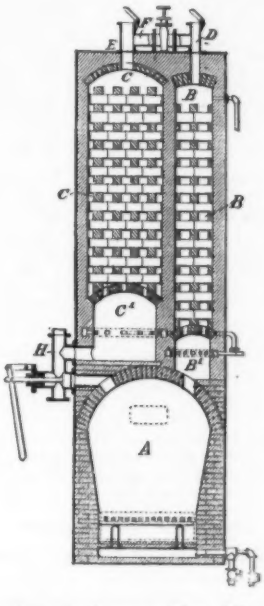
Manufacture of Gas.—Springer, T. G., of Chicago, U.S.A. No. 17,159; Oct. 27, 1890. [6d.]

This invention relates to the manufacture of gas from the decomposition of steam and heavy hydrocarbon oils, which (owing to their low specific gravity) are difficult to treat in the usual way.

The accompanying illustration is a sectional elevation of the apparatus, which is preferably cylindrical in cross section, and built of brick encased in metal.

A is the fuel and steam decomposing chamber, having an enclosed ash-pit beneath the fire-bars, wherein is situated an air-blast delivery and a steam supply, for distributing air or steam admitted (by the two pipes shown) from any suitable source. Above this chamber, but communicating therewith, are situated a vaporizing and mixing chamber B (where hydrocarbon oil is vaporized and mixed with hot water gas, and where there may be a partial decomposition of the oil and fixing of gases), and a chamber C, for fixing the oil vapours and water gas; the former being smaller than the latter. B^1 and C^1 are combustion chambers (for burning the waste gases from the fuel chamber during the blasting of the fuel and incandescence) formed in the lower portions of the chambers B and C respectively, beneath the perforated arches which support the refractory material. Each combustion chamber is furnished with an air-blast pipe. D and E are outlet-pipes placed at the summit of the chambers B and C, and provided with tight-fitting lids. F is a pipe connecting the pipes D and E, and closed by a cut-off valve. There is a pipe at the upper end of the vaporizing chamber B, for the admission of the hydrocarbon oil. The furnace is in direct communication with the combustion chamber B^1; and the communication between the furnace and the combustion chamber C^1 is by the pipe H, which leads also through a water seal to a gasholder. This constitutes an outlet for the gas as manufactured; a piston-valve closing communication between the furnace and the chamber C.

The process of manufacture is as follows: The furnace is first charged, the valves being all open. The air blasts are then set in action; and the products of combustion from the fuel are caused to heat the apparatus, including the refractory material contained in the chambers B and C, through which they pass to the outlets D and E. Having created sufficient heat, and reduced the fuel in the furnace to an incandescent state, the air blast is stopped, the valves are closed, except that in the pipe F (connecting the chambers B and C), which is opened. Steam is admitted beneath the fire-bars, and passes upwards through the incandescent mass of fuel, by which it becomes decomposed, to the chamber B, wherein it is further heated by the refractory material. At the same time, hydrocarbon oil, admitted by the pipe to the upper part of the chamber B, drips down through the refractory material (preferably of a metallic or non-absorbent character), and, becoming vaporized as it descends, meets and mingles with the



water gas resulting from the decomposition of the steam. The mingled vapours of steam and oil then pass by the pipes D, F, and E to the chamber C, wherein they are subjected to the heat of the refractory material, through which they are forced by pressure from behind; and they are thereby converted into a fixed illuminating gas, before passing by the water seal, to the gasholder. This operation continues as long as the heat is sufficiently maintained. But as soon as it becomes too low to properly decompose the steam and oil, the supply of these is cut off by the attendant; the positions of the valves are reversed; and the blasting operation is repeated until the requisite heat is regained.

By admitting the oil high up in the apparatus, and allowing it to descend over an extensive and highly-heated surface, such as the checker-work of the vaporizing chamber B, meeting in its downward course the advancing body of decomposed steam, the patentee claims to be enabled to deal with oils of a specific gravity that are otherwise very intractable for gas making.

APPLICATIONS FOR LETTERS PATENT.

6090.—Bickerton, H. N., "Improvements in gas motor engines." April 9.

6094.—Lanchester, F. W., "Improvements in gas-engines." April 9.

6144.—Ramsey, T., and Smith, G., "Improvements in toilet cases and gas-fittings for the same; applicable also to gas-fittings for other purposes." April 10.

6159.—Hardman, J., and Peake, J., "Improvements in retort-charging devices." April 10.

6161.—Crawford, F. H., "Improvements in or in connection with the driving of gas motor engines." April 10.

6226.—Watson, E., "A high-pressure water-meter." April 11.

6410.—Day, J., "Improvements in gas-engines." April 14.

6433.—Guest, G., "Gas-exhauster sight-feed lubricator." April 15.

6508.—Cunningham, J. G., "Pneumatic water-meter." April 16.

6547.—Wood, J., "A gas regulator or governor." April 16.

6578.—Barclay, A., "Improvements in and relating to gas-engines." April 16.

6598.—Ridealgh, W. R., and Welford, R., "Improvements in gas or vapour engines." April 17.

6741.—Bolz, C. H., and Luhning, A., "Improvements in the manufacture of illuminating and heating gas." April 20.

6794.—Jones, F. J., "Improvements in apparatus for washing or scrubbing and purifying gas in gas or coke making." April 20.

6839.—Fairbank, J., "Improvements in gas-fittings." April 21.

6851.—Deighton, W., and Wright, T., "Improvements in indices for gas and other meters." April 21.

6903.—Weston, M., Martin, W., and Shepard, W. A., "Improvements in devices for recording the readings of gas and other meters." April 21.

6908.—M'Laren, J., "An electro-magnetic gas controller." April 22.

6947.—Cotton, W. T., and Crowther, E. F. B., "An improved fire-clay (inclined) gas-retort with fittings attached to feed and clear the retort." April 22.

6949.—Key, W., "Improvements in and relating to the treatment of the discharge gases from gas-engine cylinders." April 22.

7064.—Caddick, A. C., and Co., "Improvements in apparatus fo making gas." April 24.

7092.—Lister, A. A., "Improvements in apparatus for extracting tar and ammonia from gas." April 24.

7202.—Jones, F. J., "Improvements in the manufacture of coke." April 25.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Walker's Over-Ground Gasholder-Tank.

SIR,—Mr. Marshall does not like my condemning the "Intze system," and retorts that an "ounce of practice is worth a pound of theory." One is almost tempted to ask, Has Mr. Marshall's practical acquaintance with the *construction and actual making* of gasholders been so extensive that he can afford to quote this cant phrase to me? It is, I fear, another case of "ignorance being bliss" on his part. Mr. Marshall appears positively to revel in his proverb "ignorance being bliss, 'twere folly to be wise." I may remind him that it did not prove to be so at Constantinople, when a holder of similar type—viz., the guide-framing tacked on to the sides of the above-ground tank—went to grief, and destroyed the whole gas-works. (See *ante*, pp. 206, 643.) This holder was, I am informed, made by one of the Continental firms named in Mr. Marshall's letter, and held up by him as such types of progress.

But to come nearer home. Did Mr. Marshall himself find it "bliss" when the accident happened to the Flensburg gasholder of the "Intze" type, as recorded in the *Journal für Gasbeleuchtung*, 1890, p. 509? and of which the following is a translation: "Flensburg. Accident to a Gasholder. We are told that on the 17th of August, the wrought-iron tank of the gasholder built this year, of 2000 cubic metres contents, broke down a short time before the filling of the tank was completed, it is said on account of insufficient foundations. An unequal settlement of the foundations of the tank is said to have been noticeable at the very beginning of the filling."

We have all been led to believe that security against bad foundations is one of the advantages of the system! This, however, is entering upon the discussion of the *disadvantages* of the system, about which Mr. Marshall prefers to remain "ignorant." So I forbear.

F. S. CRIPPS.

Sutton, Surrey, April 30, 1891.

P.S.—It is worth noting that the total capacity of the whole of the 48 gasholders Mr. Marshall enumerates, probably does not equal the capacity of one gasholder in England.

Rack-and-Pinion Gearing for Gasholder Guidance.

SIR,—A note made by you on this subject, in the "Correspondence" columns of your issue of April 28, appears to me capable of leading certain of your readers into possible danger. It will be well that any persons inclined to accept the liberty offered in that note, to freely use Mr. Livesey's suggested plan, or Mr. Terrace's, as the case may be, should know that there is a long prior patent, granted to Gadd and Mason, dated Dec. 12, 1888, and numbered 18,119, for a columnless gasholder guided by both rack-and-pinion and other gearing.

Although I doubt whether the plans you illustrate would form either a good or economical variation of that invention, nevertheless I consider them both covered by the foregoing patent, under which Mr. Mason and myself intend to take action whenever we find our rights infringed upon, whether the infringement comes fortified with a patent or not, as the taking out of a patent does not give immunity in this regard. I may add that, as indicated in the specification, numerous variations of our gearing patent may be made without departing from the peculiar character of the invention.

For very shallow holders, the original, and, as I believe, the better invention of spiral guiding, is all that can possibly be desired, as by its use a supported sheet of metal may be as readily and securely guided as a properly domed holder.

WILLIAM GADD.

Manchester, May 2, 1891.

The Damas Gill Reservoir of the Lancaster Corporation.—The new reservoir which the Lancaster Corporation have been constructing at Damas Gill is now practically out of the hands of the Engineer and Contractors. The work has been in progress between three and four years. It was originally let for about £15,600; but it is stated that it has cost something like £5000 above that figure.

Extensions at the St. Helens Corporation Gas-Works.—In addition to the new 1,000,000 cubic feet gasholder at Eccleston, with its inlet and distributing mains, the Gas Committee of the St. Helens Corporation have adopted the recommendation of their Engineer and Manager (Mr. S. Glover), to make a considerable extension of the purifying plant, the contract for which has been let to Messrs. C. and W. Walker, together with one for the supply and erection of a new vertical condenser. The washing and scrubbing apparatus is to be completed by the addition of one of Messrs. Clapham Bros. "Eclipse" washers. The tar extractor is also to be extended; and a report prepared upon the utmost capacity of the present retort-house, with a view of getting ready for future enlargement.

Georgetown (British Guiana) Gas Company, Limited.—The report of the Directors of this Company for the half year ended Dec. 31, 1890, which will be presented to the shareholders at the ordinary general meeting on the 19th inst., states that the profit for this period amounted to £1623 19s., which, added to the balance brought from the last account, makes £3611. After paying the dividends to June 30, 1890, the interest on debentures to Dec. 31, 1890, and carrying £500 to the reserve fund, there remains an available balance of £1823 10s., out of which the Directors recommend the declaration of a dividend for the half year on the preference capital at the rate of 8 per cent. per annum, and on the ordinary capital at the rate of 7 per cent. per annum, both less income-tax (except upon those dividends which are payable to the local shareholders). This will leave a sum of £656 to be carried to the next half-year's account. The Engineer (Mr. T. B. Younger) reports that the works and mains are in good order and repair. The Directors announce with deep regret the death of Mr. Robert King, who had been one of the Auditors of the Company since its formation in 1871. The vacancy thus caused will be filled up at the meeting; and Mr. Magnus Ohren is a candidate for the vacancy.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Private Bills last week:—

Opposition withdrawn: Alloa Water Bill.

Bills presented and read the first time: Gas Provisional Orders Bill, to confirm certain Provisional Orders relating to the gas supply of Cirencester, Godstone, Matlock, and Staines and Egham; Water Provisional Orders Bill, to confirm certain Provisional Orders relating to the water supply of Corsham, North Sussex, Rochford, Rayleigh, Leigh, and Swaffham.

Bills read a second time and committed: Fylde Water Bill; Western Valleys (Mon.) Water Bill.

Bill committed to a Select Committee, consisting of Lord Poltimore (Chairman), Lord Saltersford, Lord Inchiquin, Lord Clements, and Lord Lawrence; to meet on Tuesday, May 5: Sunderland and South Shields Water Bill.

Bills reported: Alloa Water Bill; Glasgow Corporation Bill; Leighton Buzzard Gas Bill; Market Drayton Water Bill.

HOUSE OF COMMONS.

The following progress was made with Private Bills last week:—

Bill presented and read the first time: Local Government (Ireland) Provisional Orders Bill, to confirm two Provisional Orders made by the Local Government Board for Ireland, relating to the purchase of land for water-works in the township of Clonmel and in the district of Mitchelstown.

Bill read a second time and committed: Newark Corporation Bill.

Bill reported: Mountain Ash Local Board Bill.

HOUSE OF COMMONS COMMITTEE.

Tuesday, April 28.

(*Before Sir* MATTHEW WHITE RIDLEY, *Chairman; Mr.* T. H. BOLTON, *Sir* ALGERNON BORTHWICK, *Mr.* BRISTOWE, *Mr.* H. W. LAWSON, *Mr.* J. W. LOWTHER, *Mr.* MURDOCH, *and Mr.* ROWNTREE.)

The Metropolitan Water Supply Inquiry.

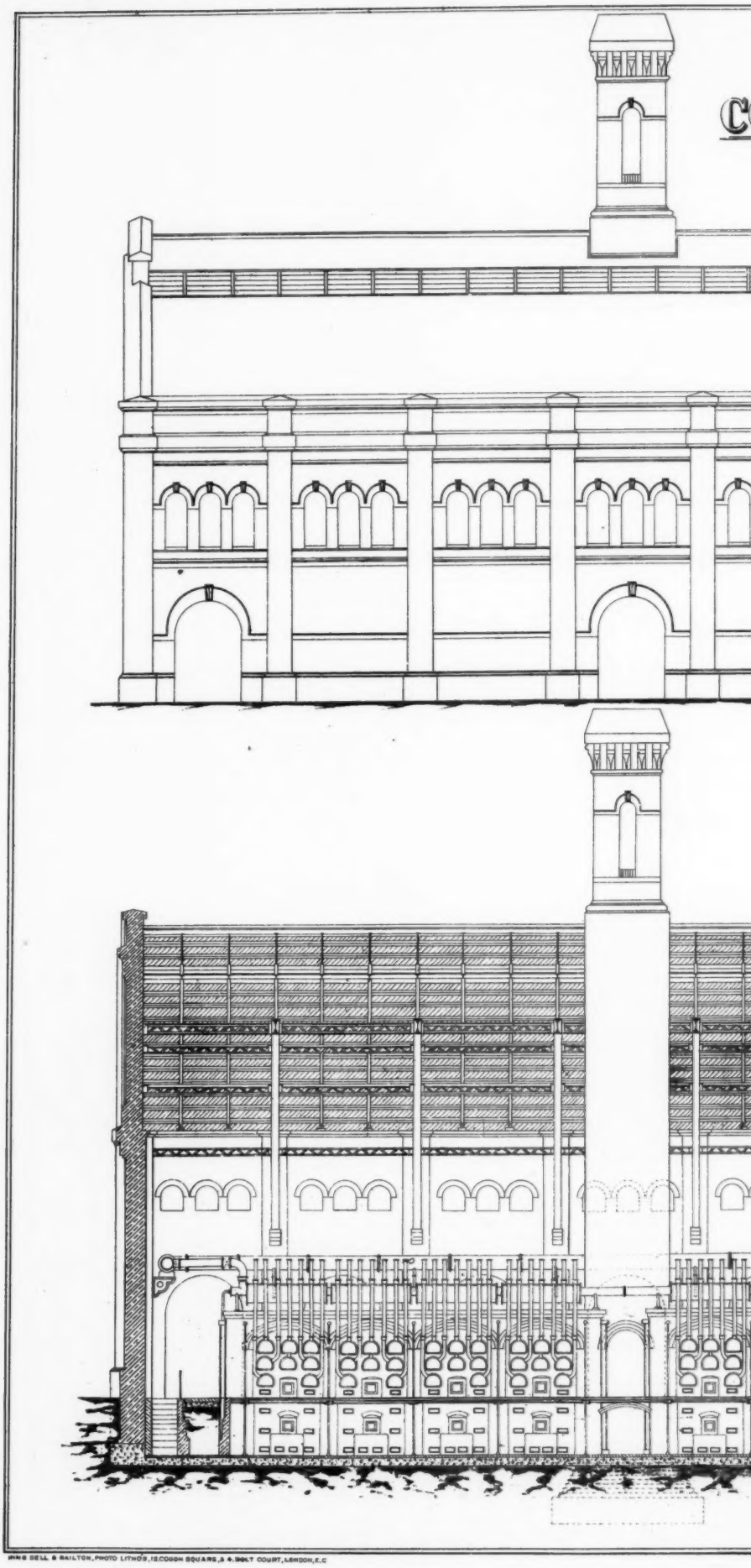
The Select Committee appointed by the House of Commons to consider the various Bills relating to the water supply of the Metropolis which have been introduced in the present session, met for the first time to-day. These are: The London Water Commission Bill, promoted by the Corporation of London; the Metropolis Water Supply Bill, promoted by a Committee representing the Vestries and District Boards of the Metropolis; the Metropolitan Water Companies' Charges Bill, introduced by the Metropolitan Members; and the Southwark and Vauxhall Water Company's Bill and the Croydon Corporation Water Bill, promoted by those bodies. Two other measures are before the House—viz., the London Water (Meter) Bill and the London County Council (Water Supply) Bill; but these had not reached a second reading when the Committee opened the inquiry.

LONDON WATER COMMISSION BILL.

At a preliminary meeting held by the Committee, it was decided to take the above-named Bill first. The object was to constitute a Public Authority "to promote Bills in Parliament for improving the supply and diminishing the cost of water in the City of London and the County of London and adjoining boroughs and populous places, and for other purposes."

Mr. LITTLER, Q.C., Mr. HERBERT SAUNDERS, Q.C., Mr. RUSSELL GRIFFITHS, and Mr. ROSE-INNES appeared for the Corporation of London; and the various opponents of the Bill were represented as follows: The London County Council, by Mr. FLETCHER MOULTON Q.C., Mr. FREEMAN, and Mr. F. W. PEMBER; the Chelsea and Middlesex Water Company, by Mr. GERALD FITZGERALD and Mr. ERSKINE POLLOCK; the New River Company, by Mr. POPE, Q.C., Mr. BIDDER, Q.C., and Mr. CLAUDE BAGGALLAY; the East London Water Company, by Mr. PEMBER, Q.C., Mr. CRIPPS, Q.C., and Mr. T. J. BARNES; the Grand Junction Water Company, by Mr. PEMBER, Q.C., and the Hon. SIDNEY HOLLAND; the Bromley Local Board, the Bromley Rural Sanitary Authority, and the Beckenham Local Board, by Mr. MEYSEY THOMPSON and Mr. CLARKE WILLIAMS; the Watford Local Board, by the Hon. SIDNEY HOLLAND; the Kent Water Company, by Mr. LEWIS COWARD and Mr. ERNEST MOON; the Southwark and Vauxhall Water Company, by Mr. BIDDER, Q.C., Mr. CLAUDE BAGGALLAY, and Mr. ALLCROFT; the Lambeth Water Company, by Mr. BALFOUR BROWNE, Q.C., and Mr. RIGG; the Conservators of the River Thames, by Mr. BALFOUR BROWNE, Q.C., Mr. BANKES, and Mr. HELPMAN; the Hertfordshire and Berkshire County Councils, by Mr. BALFOUR BROWNE, Q.C., and Lord ROBERT CECIL; the Uxbridge Local Board, by the Hon. SIDNEY HOLLAND; the Corporation of Hertford, by Lord ROBERT CECIL; and the promoters of the Metropolis Water Supply Bill, by Mr. RICKARDS. There were also a number of other opponents, who did not appear by counsel.

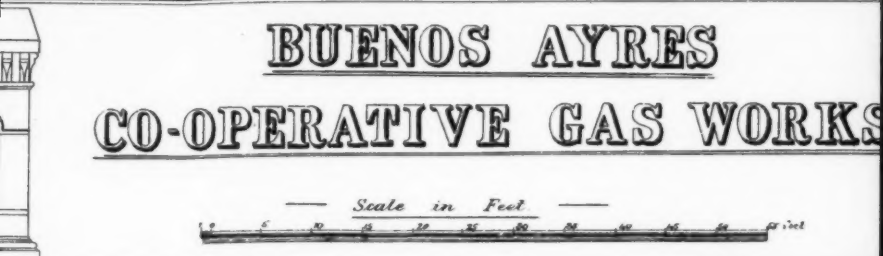
Mr. LITTLER, in opening the case for the promoters of the Bill, said that it was brought in by the Corporation of the City of London precisely in the same spirit in which they had on many occasions done work which had inured to the benefit, not merely of the City but of the surrounding districts—much in the same spirit as they had secured Epping Forest and Burnham Beeches. When one remembered the enormous population to be supplied with water—something like 6,000,000—it was scarcely a local, but almost an Imperial concern, as to how they should be supplied with the first necessary of life. The Corporation had for a long time been actively concerned in the consideration of matters of water supply; they were themselves at one time owners of water-works of a very primitive kind—viz., the water-wheels of London Bridge—which they afterwards sold to the New



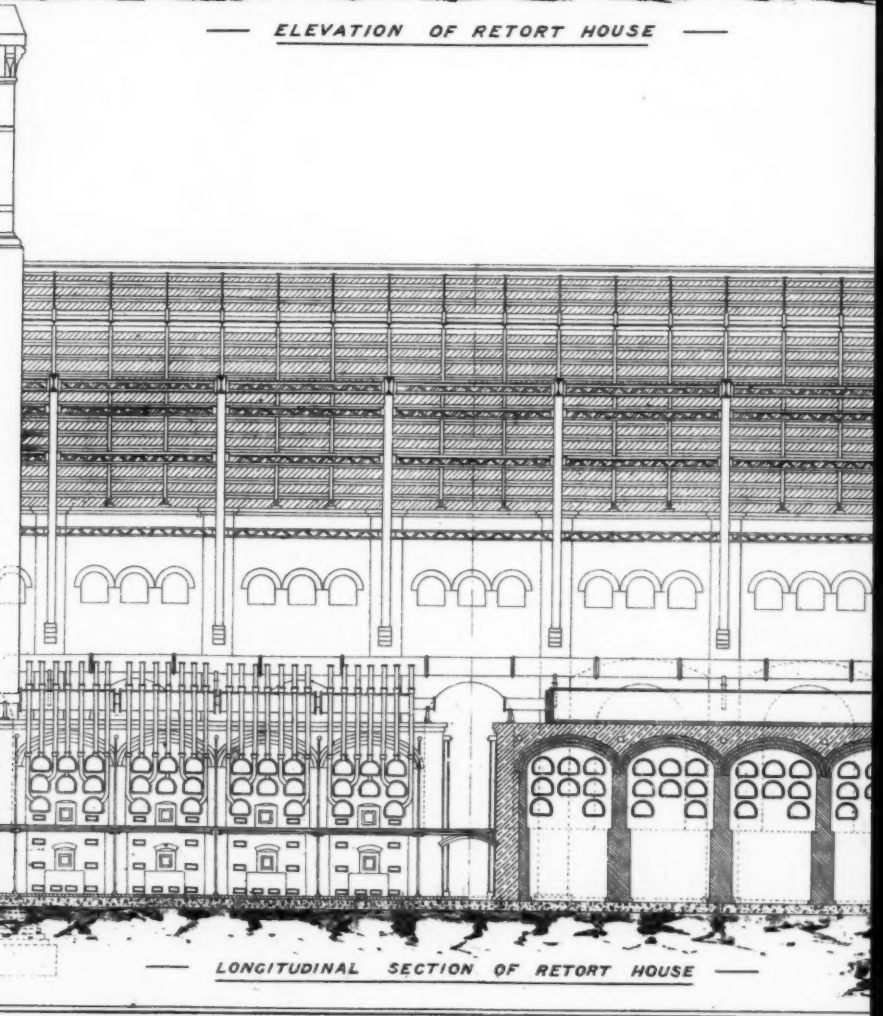
BING BELL & RAILTON, PHOTO LITHOS, 12 COGGIN SQUARE, 3 & 4, BOLT COURT, LONDON, E.C

BUENOS AYRES
CO-OPERATIVE GAS WORKS

Scale in Feet



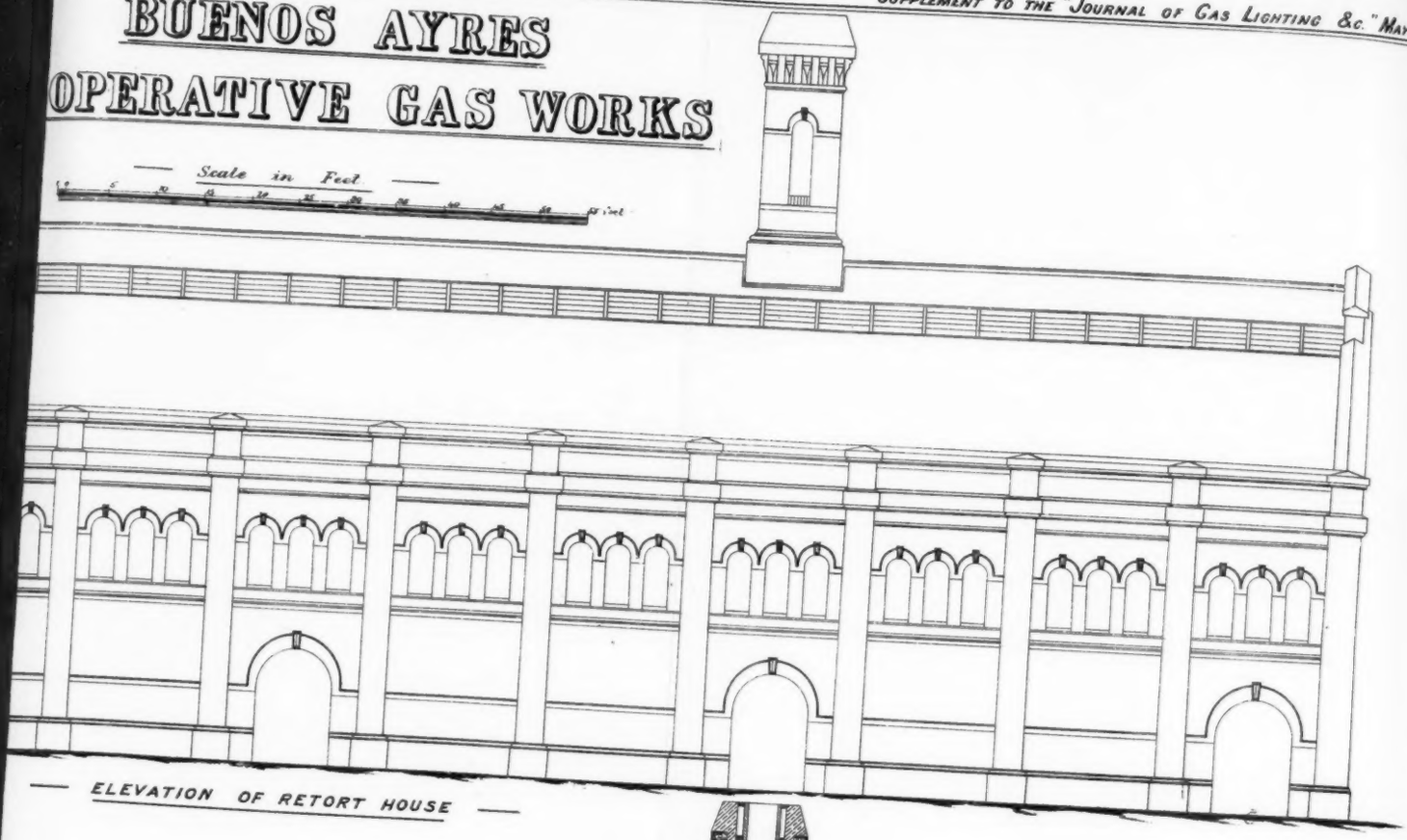
ELEVATION OF RETORT HOUSE



LONGITUDINAL SECTION OF RETORT HOUSE

BUENOS AYRES
OPERATIVE GAS WORKS

Scale in Feet



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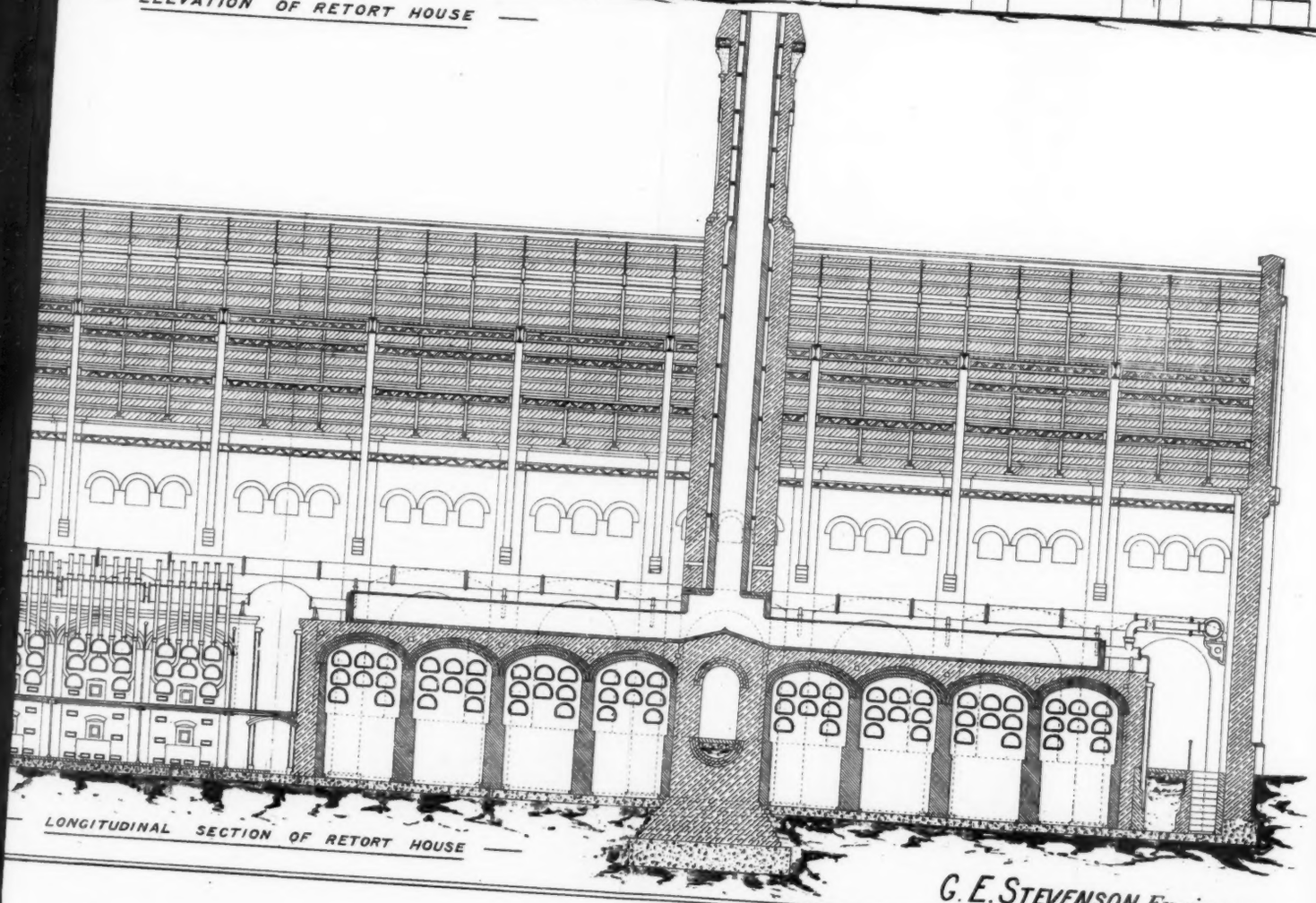

LONGITUDINAL SECTION OF RETORT HOUSE

G. E. STEVENSON, Engineer.

River Company; and to come to a later date, the Corporation had taken an active interest in matters of water supply ever since the year 1852, in which year the Act was passed under which for the first time there was started what was anything like a proper and cleanly supply of water to London. Then, later on, in the year 1867, when a Commission was appointed for the purpose of carefully considering the matter of the London Water Supply, the Lord Mayor of London was one of the Commissioners. After giving a history of the various Parliamentary Committees to which the question of the water supply of London had been referred in 1871, 1877, 1878, 1879, 1880, 1884, and 1886, the learned Counsel went on to remark that last year the Corporation had held an inquiry of their own, as the result of which they felt it their duty to propound a Bill which should be as crude as it possibly could be in its scope, and which should empower the Commission appointed under it—to use the words of Sir William Harcourt's Committee—"to represent the interests, and command the confidence, of the water consumers." The composition of the Commission was not in itself an easy task, because there were so many interests involved—the interests directly of the Water Companies, and indirectly of the places whence the present supply was obtained, or whence any future supply might be obtained. When the Committee were told that the population within the Metropolis supplied by the Water Companies was 4,497,090, whilst that outside was 1,126,000 it was obvious that a careful consideration ought to be given to the way in which, and by whom, preliminary inquiries were conducted; and it was obvious that they should not be conducted by one body, however great and powerful it might be, like the London County Council. Even the preliminary inquiries ought to be conducted by a Commission on a broader basis than that. The citizens within the County of London paid one-eighth of the general rates, and a considerable proportion of the water-rate, which was levied on the basis of the general rates; and therefore they thought they were entitled to a voice on the Commission when it was established. At the same time, however, they felt that the external area, which embraced 392¾ square miles, as against 126½ square miles in the County of London, ought also to have a considerable voice. But when they came to compare the populations of the districts supplied by the various Companies, there was a very striking difference in the proportions supplied by each. The supply of the Chelsea Company, for instance, was entirely within the borders of the County of London; the East London Company had only 13¾ square miles of its area of supply within the county, and 66 square miles beyond; the Grand Junction Company had 40 square miles beyond; the Kent Company had only 30 square miles within the Metropolis, and 147 beyond. Some of the Local Authorities, too, had their own sources of supply—notably at Tottenham and at Uxbridge; and at such places as Teddington, Ealing, Hendon, Hornsey, and so on, the Local Authorities now had a certain control, by reason of the water supply being in the hands of a Company, which they would not have if it was handed over to a public authority. Unless, therefore, some provision was carefully made with regard to their interests, they might think that they were being ill-treated and neglected. Then again as a little over half of the water supply of London was provided by the Thames, about 35 or 36 per cent. by the River Lea, and 12 per cent. from wells, there were three other sets of considerations to be dealt with. So far as regarded the wells, if a much larger supply had to be drawn from them, the other Authorities, who derive their supply from wells, had a right to a voice in the matter. In the County of Middlesex and the County of Hertford, they were already complaining that their water supplies were being gradually drained by the quantity of water pumped for London. They would therefore be fairly entitled to have a word as to what was to be done in future. In the case of the River Lea, there was another consideration—the Local Authorities of Tottenham, Edmonton, and other places were complaining of the large abstraction of water from the Lea; and they would naturally desire some representation, either through the County Council or through themselves. There were also the Local Authorities who had established rights of some kind to drain into the Lea, and the interests of the consumer in a high standard of purity being maintained. These things were intensified in the case of the Thames; and there was also this further consideration—that at the present time there were practically no reservoirs on the Thames, as the Company's reservoirs could scarcely be called storeage reservoirs. If it were not for the extreme equability of the *régime* of the Thames, London would no doubt be sometimes in extreme difficulty. Quoting from General Scott's report to the Local Government Board, he said no river in the world was so equable as the Thames; and the next to it was the River Lea. But both in regard to the Thames and the Lea, the question would arise where storeage reservoirs should be constructed; and therefore the interests would have to be considered of Middlesex, Surrey, Essex, Wiltshire, Gloucestershire, Buckinghamshire, Berkshire, Oxfordshire, and even as far as Hampshire—to say nothing of Kent, which, of course, was interested to a certain extent by reason of the Kent Company's supply. Then again there were the Conservators of the Thames to be considered. Many people were crying out that the volume of the Thames was reduced. The quantity of water at present taken from the rivers was 85 million gallons a day; the flood quantity going down the Thames being 1100 millions, and the dry weather flow 300 millions. The Companies had a right to take 130 million gallons a day, although they only took 85 millions. Then there was the question of the distribution of the water among the eight large Companies within the Metropolis, and a considerable number of smaller ones beyond. Some of the districts of the Companies overlapped one another; and consequently there was more or less inconvenience. Arrangements would therefore have to be made for proper distribution. In the circumstances he had detailed, the Corporation had come to the conclusion that it was impossible to deal adequately and properly with so great a question in the scope of one short Bill before Parliament. In point of fact, what was needed was something which would concentrate and collect for the use of Parliament that which would not only enable them to come to a wise conclusion, but which would thresh out amongst all the conflicting interests the various questions which had to be considered in concord and agreement, so as to get a Bill which would, by reason of its common sense, its moderation, and its fairness, secure the support of the largest number of those who were interested in the matter. All considerations seemed to show how grievous it would be to legislate in a hurry; and the view of the Corporation was that, following upon legislation in the direction suggested in the present session, next session Parliament might have presented to it a Bill or a series of Bills which would enable it to deal with the whole question comprehensively, and at the same time honourably and fairly, with the great central authority of London, with the Local Authorities, and with the Water Companies themselves. The Commission sought to be appointed under the present Bill having ascertained all the points of agreement, the salient points on which there was disagreement would ultimately come before the arbitration of the supreme arbiter—Parliament itself. With regard to the composition of the Commission, it was proposed that one member should be appointed by the President of the Local Government Board, and one by the President of the Board of Agriculture; that the Corporation of the City should have five representatives, and the London County Council twenty; the counties of Middlesex and Surrey, four each; Essex, three; and Hertfordshire, Buckinghamshire, Berkshire, and Oxfordshire, one each—with a further provision in case of necessity for Gloucestershire, Wiltshire, Shropshire, and Kent being represented; and also, if need be, the Thames and the Lea Conservancy Boards. Proceeding to deal with the various petitions, the learned Counsel said of one thing they might be perfectly certain—viz., that wherever the water supply was in the hands of a public trust, the poor were generally better looked after than they were by the Water Companies. For instance, taking a £50 house, and comparing the charges of the Lambeth Company with those in Glasgow, in Lambeth the charge would be £4 3s.; and in Glasgow, £1 9s. 2d. In the case of the Chelsea Water Company, in a £50 house they charged £2 4s., with 2s. for a second water-closet, 4s. for a bath, and 4s. for high service. The Grand Junction, New River, and West Middlesex Companies charged the same. The Kent Company charged £2 10s. for water-rate, 8s. for a second water-closet, and 10s. for a bath. The East London Company charged £2 14s. 4d., and 4s., with 5 per cent. extra for high service. The Southwark and Vauxhall Company charged £2 4s., 2s., 4s., and 4s. In conclusion, he cited precedents for such a Commission as that proposed—in the case of the Edinburgh and Leith Gas, the Edinburgh and Leith Water, and the Leith Purification—all of which were under similar commissions.

Mr. FREEMAN, for the London County Council, while endorsing every word which Mr. Littler had said on behalf of the Corporation, remarked that he would have to discuss with him before the Committee, in a friendly spirit, which was the proper body for carrying out the powers sought.

Mr. LITTLER said that there was an express reservation in the Bill to alter the constitution of the Commission hereafter; and when a Bill came to be promoted, then would be the time for the County Council to urge what they were now very fairly urging.

Mr. FREEMAN hoped to satisfy the Committee there was no necessity to constitute a fresh body to carry out the powers under the Bill, which the County Council entirely approved of as being necessary.

Mr. POPE, on behalf of the New River Company, said he understood that the Committee came to a determination that they would found their inquiry upon the first of the series of resolutions passed by Sir W. Harcourt's Committee. If this simply meant that they accepted as the basis of their inquiry what he might call the parliamentary sentiment that public authorities should be charged with the duties of water supply, he would not presume to ask the Committee to reconsider their determination upon a matter so general. But it was very important to all the interests involved that they should know what was really meant. The resolution which had been adopted as the basis of the inquiry was as follows: "That it is expedient that the supply of water to the Metropolis should be placed under the control of some public body which shall represent the interests, and command the confidence, of the water consumers." Before the Water Companies could remain absolutely quiescent, they would like to know what the extent of the jurisdiction of such a public body was to be. What was the meaning of "Metropolis." Mr. Littler, as representing the Corporation, meant one thing, and Mr. Freeman, as representing the County Council, meant another. The area of supply of the Companies to be covered by the jurisdiction proposed to be set up by the Bill, was one thing, and the area governed by the County Council was another. In both of these areas there were local bodies besides the Council, all of whom were petitioning that they should not be excluded from the privilege of having control of the water supply within their districts. Therefore, although he would advise the Companies to intervene as little as possible in a discussion of general parliamentary principle, they must know exactly what the Committee meant by "Metropolis." Did they mean the water area? Did they mean the district of the County Council? Or did they mean the City area? Did the Bill define it? or did Mr. Littler define it as he ought to do before they could proceed to discuss the question at all? And not only that, but before they could remain quiet the Companies would like to know what was meant by "under the control of some public body." Did it mean, as in the case of the Gas Companies, that they were to be regulated by certain restrictions, but to remain in the hands of private enterprise; or did it mean that the private undertakings were to be acquired by a public body, and managed for the profit of the community? There were a hundred questions which might arise; and was a single day's progress made in the settlement of the water question by simply constituting a roving Commission to promote future Bills, which might cover any district or none, and which might buy up any Company or none? Surely the first thing to be done was to have some definite proposition upon which the Committee could found something; and without such a definite proposition, he submitted that no Bill of such a character ought to receive the sanction of Parliament.

Mr. GERALD FITZGERALD, on behalf of the West Middlesex and Chelsea Water Companies, endorsed what had been said by Mr. Pope. He would further remind the Committee that Sir W. Harcourt's Committee took no evidence at all beyond financial evidence as to the bargain proposed to be effected by what were known as Mr. Smith's agreements, and that the Water Companies were not represented, with the exception that one speech was made on their behalf by Sir Edmund Beckett. With reference to a suggestion which had

been made by Mr. Littler, that the Committee might possibly feel themselves in a position to pass the Bill without taking evidence, he ventured to suggest that it was extremely important, in the interests of the Companies, and of the other opponents, that someone should be called as a witness to explain what the Bill meant, and what were the provisions it was intended the Commission should carry out.

Mr. LEWIS COWARD, for the Kent Water Company, said that they supplied water as far as Gravesend on the one side and Westerham on the other; and no part of their area of supply was in what was generally known as London. Therefore, before the Committee could start upon the basis of Sir W. Harcourt's resolution, it would be necessary to hear evidence on behalf of the Kent Company.

The CHAIRMAN said: Certainly. All that the Committee mean by their decision is that they do not desire to hear evidence to satisfy them that Parliament has changed its mind as to the expediency of there being one controlling authority for the Metropolis. It is essential that we should hear evidence as to what the area should be, and that all these other interests should be considered.

Mr. RIGG, for the Lambeth Water Company, contended that, as an enormous part of their area was altogether outside the Metropolitan District, the preamble of the Bill must be proved in the ordinary way by evidence, so that there might be an opportunity of cross-examining the witnesses.

Mr. BALFOUR BROWNE, on behalf of the County Council of Hertfordshire, said that at the present time 70 million gallons of water a day were taken from Hertfordshire for the supply of London, to the very serious detriment of the county, as the wells were dry, and they had no water of their own. First of all, they objected to only having one representative on the proposed Commission; and, in the second place, they asked to be allowed to keep a certain portion of their water for their own needs and requirements. On behalf of the County Council of Berkshire, he asked that if in future any additional water supply were obtained from the Upper Thames Valley by the construction of storeage reservoirs there, it should only be done on terms of compensation being given; and further that clauses should be introduced into the Bill, saying that, if London took water from the sources at the top of the Thames, they should be bound to supply all the places along the route of the pipes between those sources and London. When Manchester went to Thirlmere, it was a special instruction to the Committee that they should supply water to the places along the route; and the same in the case of Liverpool.

Lord ROBERT CECIL submitted that the Borough of Hertford were entitled to be heard on the question of the area of supply.

The CHAIRMAN said that, if it came to a question of considering these various points, of course the parties would all be entitled to be heard by the Committee.

Mr. LITTLER said that it was not proposed that either Berkshire or Hertfordshire should be interfered with without their being heard. Moreover, he admitted that Hertford had been harshly treated in the past; and whenever they came to be dealt with, they ought to have a right to be heard, not only as regards future legislation but also past legislation. The powers sought by the Bill were controlled by the words at the beginning of clause 3: "The Commission shall have power from time to time to promote Bills in Parliament" for certain objects; and, amongst them, "to supply the inhabitants within such area as Parliament shall from time to time authorize or direct with water." Such area was to be defined hereafter. Then there were powers to acquire the undertakings by arbitration or agreement. It could not in any way injure the Companies to make public or private inquiries; and, with the exception of the London County Council, the whole of the opponents seemed to be a little premature. If it were proposed to grant powers to the London County Council over the County Councils of Middlesex and Surrey and other districts, it would be vehemently opposed, and that was a question which seemed to him to come well within the provision enabling the constitution of the Commission to be varied by Parliament. Hereafter an area would first have to be established; and then it would have to be decided who was to be the controlling authority. But until the area was established, other authorities would denounce the idea of the London County Council getting control over them. That, however, was a question to be discussed not on the preamble of the Bill, but on the constitution of the Commission. He was prepared to put Sir Douglas Galton and other witnesses into the box to say that all the powers, one by one, were practicable and reasonable; but it seemed to him that these things were not so much matters of evidence as matters of argument.

Mr. RICKARDS asked the Committee not to give a decision on the Water Commission Bill before they had heard the evidence in support of the alternative scheme—the Metropolitan Water Supply Bill.

Mr. BALFOUR BROWNE supported the application.

The CHAIRMAN: Practically the governing words of the preamble are: "It is expedient to constitute an authority which shall represent the interests, and command as well the confidence of the consumers." It would be quite ridiculous for the Committee to take evidence upon that point, or to require it to be proved. But what is the nature of the powers of the proposed Commission, or whether it is to be called a Commission, practically constitutes, as it seems to me, the preamble of the Bill. Then what evidence can be offered to this Committee in the shape of explanatory evidence? You do not suggest that you can open the other Bill now, Mr. Rickards?

Mr. RICKARDS: No, Sir. But what I would suggest to the Committee is that, after you have heard the evidence for this Bill, and the evidence against it, the inquiry with reference to this Bill will then be complete; and that you should then, without giving a decision on the Bill, take the evidence for the Metropolis Water Supply Bill.

The Committee-room was then cleared; and after the Committee had deliberated in private, the public were again admitted.

The CHAIRMAN: The Committee have considered this matter very carefully; and they have come to this conclusion: They are of opinion, on the opening of the case by Mr. Littler, that no Bill can satisfactorily deal with the questions referred to this Committee which merely constitutes a public authority to promote Bills in Parliament. Therefore, practically this means that we cannot see our way to passing the preamble of the Bill.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Saturday, April 25.

(*Before Mr. Justice* CHITTY.)

The Proposed Reduction of the Capital of the Continental Union Gas Company, Limited.

The objects for which this Company was established were the acquiring and working of concessions, charters, or other privileges for the manufacture and the supply of gas on the Continent of Europe. The capital was originally £400,000, divided into 20,000 shares of £20 each; but, pursuant to powers contained in the Memorandum of Association, the capital has from time to time been increased, and now consists of £1,000,000, divided into 50,000 shares of £20 each, of which 10,000 are preference and 40,000 ordinary shares. All the 50,000 shares have been issued, and on the 10,000 preference shares £20 each has been paid, and also on 27,866 ordinary shares; but on 12,134 ordinary shares £14 each only has been paid. The Articles of Association, as originally framed, did not contain power to reduce the capital; but by a special resolution passed on the 12th of August, 1890, and confirmed on the 27th of the same month, clauses were added to the Articles, empowering the Company from time to time, by special resolution, to reduce the capital by reducing the liability on the partly-paid shares, or any part of them as might seem expedient, and also to convert any paid-up shares into stock. By a special resolution passed on the 9th of September, 1890, and confirmed on the 24th of that month, it was resolved that the capital of the Company should be brought down from £1,000,000 to £927,126, by reducing the 12,134 new shares of £20 each (with £14 paid thereon) to 12,134 shares of £14 each. The Court was asked to confirm this resolution; but questions arose as to whether the effect would not be to alter the constitution of the Company. It was admitted that the intention was to convert the shares into stock.

Mr. BYRNE, Q.C., and Mr. REGINALD HUGHES appeared for the petitioners.

Justice CHITTY said it appeared by the Articles that the members of the Company were to be entitled to one vote in respect of each share. It was therefore clear that if the proposed reduction was sanctioned, and the conversion of the shares into stock was carried out, the holders of £14 shares would only get votes for every £20 of stock they might hold. This was in itself a fatal blot; and on this ground, and without going into any other questions, he dismissed the petition.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Wednesday, April 29.

(*Before the* LORD CHIEF JUSTICE OF ENGLAND, *and Justices* MATHEW, CAVE, A. L. SMITH, *and* CHARLES.)

The Queen v. Curran and Others—The Plymouth Intimidation Case.

This was an appeal from the judgment of Mr. H. M. Bompas, Q.C., Recorder of Plymouth, in the action brought against the Secretaries of three Trades Unions having branches in that town, for intimidating Mr. G. F. Treleaven, a coal merchant. The case, it may be remembered, was tried in November last by the Borough Magistrates, who convicted the defendants, under section 7 of the Conspiracy and Protection of Property Act, 1875, and fined them £20 each and costs. From this decision an appeal was made to the Recorder, who, after a hearing extending over two days, sustained the conviction, for the reasons which were fully set forth in his judgment, the text of which was given in the JOURNAL for Jan. 20 last (p. 114). As the matters at issue raised the whole question of the legality of strikes, Mr. Bompas agreed to state a case for the Superior Court; and this came before their Lordships to-day.

The case stated by Mr. Bompas commenced by setting out all the facts in detail; but, as these have already been given, it is unnecessary to repeat them here. Coming to the points submitted by the parties to the dispute, he said: For the prosecutor it was contended (1) that intimidation is, under the statute, not confined to threats of violence to the person or physical injury to property, and that upon this point I was bound by the decision of the Queen's Bench Division in the case of *Judge v. Bennett* (52 J.P., 247); (2) that intimidation is not confined to causing fear of conduct amounting to a criminal offence, but that causing fear of injury by any illegal act may amount to intimidation; (3) that to cause fear, with the view of compelling a man to do or abstain from doing what he has a legal right to abstain from doing or to do, even by legal acts, may be within the statute; (4) that the words and acts of the defendant* caused reasonable fear that the defendant and Shepheard and Matthews and the Unions of which they were Secretaries would pursue, to the prosecutor's injury, a course of conduct which was illegal, though not criminal, with a view to compel the prosecutor to abstain from doing what he had a legal right to do—viz., to continue to employ the non-Union men who were working for him; (5) that with regard to intimidation, as with regard to menace, it was a question of fact. It was contended for the defendants (1) that there could be no intimidation within the Act unless there was a reasonable fear of violence to the person, family, or property of the person alleged to have been intimidated; (2) that the defendant was guilty of no offence in calling out the men, and could not therefore be guilty of intimidation by occasioning fear by saying that the Unions would do what they had a legal right to do; (3) that the defendant had a legal right to ask the prosecutor's workmen not to work for a master who employed non-Union workmen, and that his conduct and words only amounted to a statement that he would do so, and this was not

* The case of Curran alone was argued; the other two, against Matthews and Shepheard, to abide the result.

therefore within the meaning of the Acts. I held, for the reasons given in my judgment [which was appended to the case], that the defendant had committed the offence with which he was charged; and I confirmed the conviction, and ordered the defendants to pay the costs of the appeal. The question for the Court is whether the defendant was lawfully convicted. If he was, my judgment is to be confirmed; if he was not, my order and the order appealed from are to be quashed.

Sir H. JAMES, Q.C. (with Mr. BESLEY), appeared for the appellant, to argue that the convictions were wrong. He said the case was shortly this: The defendants, members of a Trade Union, were desirous of preventing the prosecutor, their employer, from employing non-Union men; and the only effect of their intimation—that if he did so they would not work for him—involved no threat of personal violence or physical injury, or injury to property, or any loss or damage beyond loss of money. As to the possibility of injury in a future strike, it was too remote to come into consideration. The matter had already, to a great extent, been discussed in the former case; but, at all events, this was clear in the present one—that it was a dispute between workmen and their employer. Next, for the men to leave their work without notice was not a criminal offence.

Justice A. L. SMITH: It would be wrongful.

Sir H. JAMES: But not criminal.

Justice MATHEW: It would not be criminal in one man, and so not criminal merely because done by several in combination.

Sir H. JAMES acquiesced, and said it would be no criminal offence; and there was no charge of conspiracy. It would not be punishable as a crime. Curran could not be convicted of any criminal offence, so he came within the protection of the Acts of 1871 and 1875. Perhaps he was not strictly entitled to say so; but if the case was held not to be protected, it would be directly contrary to what was notoriously intended by Parliament. This was the precise case which the proviso in the Act was intended to meet and provide for. The former Act had been construed in a certain way, and particular attention had been called to the ruling of the late Recorder (Mr. Russell Gurney), in what was called the cabinet-maker's case; and it was demanded that the offence of intimidation should be more clearly defined. In consequence of that, the proviso in section 7 of the Act of 1875 had been introduced. The intimidation intended in sub-section 1 of clause 3 was something beyond a threat—of some non-visible injury to property or business, as apart from a threat of violence. There must be a threat of personal violence; a mere threat of injury to property, perhaps at a distance, or a threat of injury to business, was not intimidation within the Act. The clause began with the use of violence to a man or his family. Every strike must injure a business more or less; and if a threat to injure the business of the man would do so, so it would be if the threat was to injure the business of the wife, if she had one, and then came the threat of substantive injury to property.

Justice A. L. SMITH: Suppose a workman says to his employer, "If you do not discharge that man, we will break everything in your house."

Sir H. JAMES: Possibly that might suffice, because of importing the immediate danger of personal violence—the employer being resident in the house.

Justice A. L. SMITH: Then it may be that, though a mere threat of injury to property may not be sufficient, a threat of violence to personal property in the employer's personal possession might suffice?

Sir H. JAMES: Mere threats of injury to a business or property would not be sufficient.

Justice CHARLES: Suppose a workman threatens to break the tools of a fellow-workman?

Sir H. JAMES said there was a separate enactment as to breaking tools; a mere threat of breaking them would not be sufficient. All the sub-sections referred to physical acts—physical acts of violence. As to mere injury to business or diminution of profits, if that were to be held sufficient, where was it to stop? Put the case of a threat to a member of Parliament that working men would not vote for him; or suppose a threat from time to time to criticize unfavourably the acts of a public man. Now, what was the effect of the Recorder's decision in the present case? If anything that intimidated was to be an offence, the mere announcement of an intended strike would be sufficient; for it certainly might intimidate the employers. Was the mere announcement of an intended strike to be an offence? The Act had better far be torn up, if such was to be its construction and effect. The strike itself was legalized, but the mere announcement of it would be an offence. Surely that reduced the Act and the judgment to an absurdity. The mere warning of the employer that there was to be a strike would be an offence, though the strike itself would be legal.

Justice CAVE: As a threat is not necessary to intimidation, the strike itself, on the same principle, might be held illegal intimidation, as the employer, if he yielded to it, might be injured in his business.

Justice MATHEW: And, on the same principle, the mere existence of the Trades Union might be held to intimidate.

Sir H. JAMES said certainly; and it would follow that any strike, however justifiable, might be held to be an offence because of its causing fear in the mind of a tyrannical and oppressive employer. There was this difference between the present case and the first—that here there had been a breach of contract by the men; but there was no criminal offence in that.

Justice CAVE: If there was intimidation, the breach of contract would be no offence.

Sir H. JAMES said certainly not. In any view, it was immaterial, and could make no difference. The Recorder seemed to think that the case of *Judge v. Bennett* governed the case; but he (Sir H. James) contended that it did not, for it was quite different from the present. He therefore submitted that the judgment could not be supported.

Connor, Appellant v. Kent, Respondent—The Newcastle Intimidation Case.

This was a case stated by Mr. Digby Seymour, Q.C., Recorder of Newcastle, on an appeal from a conviction by Magistrates of Connor "for that he had unlawfully, and for the purpose of inducing Kent to abstain from a lawful act, intimidated Kent." The real ground of appeal was that no evidence of intimidation was given. The facts were stated by the Recorder thus: Evidence was given before me that the respondent Kent was in the employment of Messrs. Langdale and Co., of Newcastle-upon-Tyne, as check-weigher in the weighing out of cargo which was being discharged from a ship lying alongside their wharf. On the 26th of August, 1890, Kent was engaged in checking, while two or three other men were assisting about the machinery necessary for the delivery of the cargo. About five minutes past twelve o'clock at noon, the appellant Connor, who was a delegate of the Tyneside and National Labour Union, called upon Kent, and asked if he had a ticket—meaning a card of membership of the said Union. Kent produced his card of membership in the Universal Union of Labour; but Connor, after looking at it, said, "This will not do for here." Kent said, "Why?" To which Connor replied, "You cannot start at one o'clock unless you get an official order from Stanley, or pay me 2s. 10d." Stanley was the Secretary of the National Labour Union; and the men working at the wharf in unloading the vessel were members of that Union. The sum of 2s. 10d. was explained to mean 2s. 6d. entrance, 3d. subscription, and 1d. for the book. Kent asked that the matter should stand over, as he had not the money; but Connor would not consent. Whereupon Kent, in order to be able to start work again at one o'clock (the expiration of the dinner hour), went and borrowed the money. The other men who were working on the wharf had waited for the result of the conversation, to see whether Kent joined the Union or not, having known that Connor was going to call him to account; and when Kent returned with the money, he paid it to Connor under protest. Kent said that he got the money because he could not start work at one o'clock if he did not do so; that he was afraid of not being able to go on—that they would not let him work; that it was a job worth £5, and he would have lost it. Kent further said that physical violence was not suggested; but he expected the men would retire from the employment unless he joined the Union, and so he would have to go. Also that he expected to be stopped by their refusing to work with him; and if they did not work in discharging the cargo, he could not work as check-weigher. Connor admitted in evidence that he was a delegate, and that he told Kent that the men of his Union would not work with non-Union men in that factory; but he denied having said that Kent would not be allowed to go to work unless he paid the money. Connor, in reply to me, said that he did not know whether Kent's job was worth £50 or 50 pence, but that if it ruined the man he was to carry out the rules of the society. Having adjourned the consideration to the 21st day of November, I, at an adjourned sessions, then found as facts: (1) That Kent was not threatened with physical violence, and was not afraid of physical violence being used towards him. (2) That Connor, after having notified the other men of the step he was about to take, did tell Kent that he (Kent) would not be allowed to start work unless he got an official order from the Official Secretary or paid 2s. 10d. (3) That Connor thereby meant that unless Kent forthwith consented to join the Union, the other men, at Connor's order, would leave the employment, and thus prevent Kent from working; and that Connor thereby meant to intimidate, and did, in fact, intimidate Kent. (4) That the other men awaited Kent's decision in obedience to instructions from Connor. (5) That Kent was reasonably afraid of losing his employment, and of being prevented from earning £5, by Connor's threat of Kent not being allowed to start work, and was thereby intimidated, and was forced to join the Union, and paid the sum of 2s. 10d., and was compelled to abstain from working as check-weighman at the wharf without joining the Union. (6) That the aforesaid Magistrates had properly convicted the appellant. I hold that, in point of law, intimidation is not confined to threats of physical violence, but may include words calculated to put any person in fear of any injury to, or loss of property, business, or employment. The appellant, Thomas Connor, being dissatisfied with my decision, has asked me to state a case for the opinion of this honourable Court, which case is above stated. The question of law arising on the above statement for the opinion of the Court is whether, upon the facts stated and found, the appellant was guilty of intimidation within the meaning of the Conspiracy and Protection of Property Act, 1875 (38 & 39 Vict., cap. 86, sec. 7). If the Court shall be of opinion that I decided rightly, the conviction is to stand; but if the Court shall be of opinion otherwise, then the conviction is to be quashed.

Mr. LAWSON WALTON, Q.C. (with Mr. D. ASKEW), appeared for the appellant, and said the case was substantially the same as the first one, and therefore he need not repeat his former argument.

Mr. POLAND, Q.C. (with Mr. R. NEVILLE), on the part of the prosecutor, submitted that the party had been improperly examined as a witness, and that his evidence ought to be struck out.

Lord COLERIDGE: We cannot strike it out, for it is part of the case as stated, and the Recorder says he relied upon it.

Mr. WALTON: Then the case is to be argued as it stands, upon evidence legally inadmissible?

Their Lordships having consulted together,

Lord COLERIDGE said: There is really great doubt whether the case can be heard. By some strange inadvertence on the part of the Recorder, he admitted the evidence of the accused, and acted upon it. The case can hardly be heard as stated, and the conviction must be quashed.

Mr. WALTON: If the order is quashed, the conviction stands. The appeal is from the Recorder's order.

Their Lordships having again conferred,

Lord COLERIDGE said: As it is submitted to us whether the Recorder was right, and, if not, that the conviction was wrong, the conviction must be quashed.

Mr. POLAND then replied on the two other cases. Intimidation, he said, was anything which intimidated.

Justice CAVE: Then why are the other terms in the enactment? Why is it not put simply thus—"whoever shall intimidate," &c.?

Mr. POLAND said virtually it was so. The classes of cases mentioned were put as illustrations. As to the argument that a strike might be deemed to be intimidation, it could not be so, for a strike was not unlawful. This was intimidation by unlawful means. Adverting to the Plymouth case, the learned Counsel said the object of the men was to coerce their employer to dismiss their fellow-workmen.

Lord COLERIDGE: Of course, that is the very object of Trade Unions. That used to be considered illegal; but now, by a series of statutes, concurred in by persons of all parties in Parliament, the law has been altered in that respect.

Mr. POLAND admitted this, in so far as the combinations were restraint of trade, but not as conspiracies to coerce employers to dismiss non-Union men—that is to injure others, and perhaps ruin the employer. There was evidence to justify the Recorder in finding that the employer was intimidated, and by unlawful means.

Lord COLERIDGE: Suppose a railway company to say to their customers, "If you carry by a rival's line, we will charge you extra," is that "intimidation?"

Mr. POLAND said that question would be better answered when the House of Lords had decided the Mogul Steamship Company's case.

At the close of the arguments,

Lord COLERIDGE said the Court would take time to consider their judgment.

San Luis Potosi Water Company, Limited.—A Company has been registered under the above title, with a capital of £250,000, in £10 shares, to carry into effect an agreement made between the Trust, Loan, and Agency Company of Mexico of the one part and the Company of the other part, to supply the city of San Luis Potosi, Mexico, and the neighbourhood thereof, with water, and to carry on generally the business of a water-works company in all its branches.

Electric Lighting at Southampton.—The Southampton Electric Light and Power Company, which was formed about two years ago, have just commenced business. The inauguration ceremony took place on Monday evening of last week, when the Chairman (Mr. Alderman J. Miller) and the Directors entertained a number of gentlemen at dinner. Afterwards Miss Amy Miller "switched on" the light. The central station, two or three business establishments, and the Bargate were illumined by the light; and the exhibition, says a local paper, was a source of interest to an immense crowd of spectators.

The Davis Gas-Stove Company, Limited, are determined that no effort shall be wanting on their part to educate the public up to the appreciation of the advantages of gas for cooking purposes. This week they are holding exhibitions of their appliances at Margate, Bedford, and Exmouth, under the auspices of the Gas Companies in these towns, as well as at Newcastle-under-Lyme, with the sanction of the Corporation. In addition to the above-named places, the Company will be represented at four exhibitions by the London Gas Companies—three by The Gaslight and Coke Company, and the other by the South Metropolitan Company.

Slatter and Watkins's "Inlet" Gas-Regulators.—Attention has already been directed in the JOURNAL to the "inlet" gas-regulators of Messrs. Slatter and Watkins, of Little Marlborough Street, W., the characteristic feature of which is that the supply of gas is controlled before it enters the meter. These appliances were shown in action at the Ironmongers' Exhibition at the Agricultural Hall, Islington, noticed in our columns last week. The apparatus is being much patronized by large consumers of gas, such as licensed victuallers, public institutions, &c. Messrs. Slatter and Watkins have numerous sizes of both classes of their regulators—the "inlet safety" and the "improved" inlet double check—now on view at the Manufacturers' and Inventors' Permanent Exhibition in St. Andrew's Street, Holborn Circus, which is their City address.

Improvements at the Middlesbrough Gas-Works.—At a meeting of the Middlesbrough Corporation Gas Committee last Wednesday, Alderman Bulmer presiding, proposals for increasing the gas supply of the town were discussed. The Manager (Mr. David Terrace) in a previous report upon the inclined retort system, stated that, in order that the carbonizing power of the new retort-house might be increased, he was making full inquiries as to the adaptation of the system. The result of these led to the conclusion that they would be able to augment the output of gas by about 50 to 100 per cent.; thus making the present works last two or three years longer by the arrangement. It was reported that the Manager had inspected the new inclined retort system as in use in London, and that he recommended its adoption. It was estimated that the outlay for this would be about £4000; while the system could be extended if necessary at the end of three years. It was decided to adopt Mr. Terrace's recommendations.

The Public Lighting of Wimbledon.—One of the questions which came before the candidates at the recent election of the Wimbledon Local Board was that of the public lighting of the district—a subject which is now greatly exercising the minds of the inhabitants, owing to the difficulties by which it is surrounded. First of all, the lighting is now done by oil; and it is acknowledged to be very bad. In fact, a writer in a local paper says he never in his life visited a town so badly lighted as Wimbledon; and he adds that it is almost incredible that a place so near London should still depend upon oil as an illuminant. But while admitting the inferiority of the existing system, he does not think it should be discarded without careful consideration. Turning to its rival—gas—this is objected to on three grounds—its price is high, its quality is said to be not of the best, and it is sold by a Company. It is thought that if the gas supply were in the hands of the Local Board, they would be able to effect an improvement in all these respects. But there are two obstacles to its acquisition. First of all the Company prefer to keep it in their own hands; and, secondly, it is thought that gas will, before long, be superseded by the electric light. In fact, many of the ratepayers are anxious to have this light now. But would they be prepared to use it when it was provided? It is very questionable. Because electric lighting has been fairly successful in certain manufacturing towns, it does not follow that it would be so at Wimbledon. There are no manufactories, and very few shops there; and unless electricity were generally used, it would have to be paid for very dearly. Under present conditions it could not be had except at a large increase in the rates. This, then, is the position: The oil lighting is admittedly bad; the electric light would be too costly. What is the course for the Local Board? Obviously the middle one—to see what can be done with gas.

MISCELLANEOUS NEWS.

EXHIBITION OF GAS APPLIANCES AT EXETER.

A Highly-Successful Display.

From Tuesday to Friday of last week, something like 15,000 people visited the exhibition of gas appliances held by the Exeter Gas Company at the Victoria Hall in that city. This is the second exhibition of the kind; the first having taken place eight years ago. Mr. W. A. Padfield, C.E., the Engineer and Secretary of the Company, has found that it is much better to promote an exhibition on a large scale than to have a number of small lectures. No expense or trouble was spared to render the exhibition worthy of its name; and it was adjudged, by numbers of provincial gas engineers who attended by special invitation on Wednesday, that Exeter had unquestionably taught them something.

On Tuesday morning, Mr. H. C. Lloyd, J.P., Chairman of the Company, formally opened the exhibition; upon the platform being Mr. Moore, Mr. H. Tapscott, and Mr. H. T. Clarke, members of the Board, and also Mr. Padfield. Mr. Lloyd said that, on behalf of the Directors of the Company, he had pleasure in declaring the exhibition open. Their object was to instruct the general public, and still more to show them what could be done with gas for lighting, heating, and cooking. Before the exhibition was closed, the public would be able to see every new kind of burner, stove, and appliance; besides hearing the cookery lectures of Mrs. Marshall. He hoped the gas consumers of Exeter would come cheerfully to the exhibition, and bring their domestics with them. He wanted the local public to believe that the Exeter Gas Company were their friends. He thought he ought to tell them something about the progress of the Company; and Mr. Padfield, their Engineer and Secretary, had compiled a very exhaustive tabular statement showing it. To summarize it, he would tell them that in 1841 the price of gas was 9s. 6d. per 1000 cubic feet, while in 1891 it was 3s. 1d. In 1841 they carbonized 1250 tons of coal; in 1891 the quantity was 20,000 tons. In 1841 they supplied 13 million cubic feet of gas; in 1891, 201 millions. The object of the Company was to send out the purest gas they could, and make a steady reduction in the price charged for it.

The exhibition was then formally declared open. To the exhibition itself nothing but the greatest praise can be given. The Victoria Hall was profusely decorated with 600 flags and bannerettes. Across the stage was a bold inscription, "Success to the Exeter Gas Company," in yellow letters on a dark blue ground, with the seal of the Company at either end. Another pair of bannerettes bore the words "Gas: The Fuel and Light of the Present and Future." In addition to the large and varied display of gas appliances to be hereafter described, a feature was made of three stalls, occupying 600 feet in length, on which a most varied assortment of models relating to the manufacture of gas were shown. Samples of coal and cannel were followed by specimens of coke, whole or broken, and pieces of carbon from the retorts. Quite close was a working model of West's power and manual machinery for charging and drawing retorts. Following up carbonization, the public were shown on a separate table the "products of coal tar;" upwards of 60 colours being displayed in bottles and in dyed fabrics—all by the hand of Mr. H. Beek, of 22, Bush Lane, the London agent of the Badische Anilin and Soda Fabrik, Ludwigshafen. These specimens were specially sent for the Exeter exhibition. Going back to the model stand, Messrs. E. Cockey and Sons, Limited, had on view some of their wood grids for purifiers; also two of their six and eight way valves; the Exeter Gas Company showed one of Sugg's illuminating power meters; while adjoining were a number of model gas-retorts, by Messrs. Mobberley and Perry, of Stourbridge. Other items of interest were a model gas-exhauster, by Messrs. G. Waller and Co., of Park Street, Southwark, and Stroud; a patent dial thermometer, by Messrs. Alex. Wright and Co., of Westminster; one of Sugg's stop meter-clocks; and two ordinary meters by Messrs. A. Wright and Co. The portable pressure register, by Messrs. W. and B. Cowan, attracted considerable notice; as did also the plans and photographs of the various departments of the Exeter Gas-Works. Mr. Padfield had been exceptionally enthusiastic in this particular department, for he exhibited plans of gas-works of various capacities. His great ingenuity was still more displayed by his varied assortment of tabular statements relating to a variety of subjects. He also exhibited some fine photographs of the purifying-house, the engine and exhauster, and Cockey's patent washer, with a patent arrangement of his own effecting economy. On a separate stand there were a number of trade appliances. The first was Messrs. W. and B. Cowan's testing-meter; and the same firm showed Mr. W. R. Chester's portable pressure register, and their cash-value indicator (which has already been described in the JOURNAL), which greatly interested the visitors to the exhibition. Attractive items to the general public—especially those who were suspicious of the internal working of meters—were two of Cowan's meters in glass cases. These were fixed and shown in action. A model of a weighted regulator, and a pressure-gauge completed Messrs. Cowan's list. Messrs. W. Parkinson and Co. sent 3-light wet and dry meters, both in glass cases. The Gas-Meter Company supplied a glass-cased meter with five dials, registering from 1 cubic foot to 10,000 feet; also an ordinary 3-feet dry meter. Messrs. E. Cockey and Sons, Limited, exhibited a No. 1 and a No. 2 gas-exhauster; and showed photographs of their holders, purifiers, exhausters, &c., now working at Frome, Buxton, Ystrad, and other places.

As to the general exhibits, too much praise cannot be bestowed on the many manufacturers of gas appliances who have come forward and made elaborate arrangements for the display of their novelties. The first stand to attract notice was that of Messrs. W. Sugg and Co., Limited, of Westminster. Their exhibits included the well-known "Charing Cross" gas-lamps in all sizes and designs. A novel feature was an art metal chandelier fitted with three of these lamps, the appearance of which when alight was very effective. The shop-lamps fitted with Mill's patent compound reflectors were very prominent. Two "Westminster" cookers were at work; and their advantages were thus

fully demonstrated. A "Therma" boiler, for baths, was also shown. Altogether, Messrs. Sugg and Co. are to be congratulated on their display. Close alongside was the stand of the Deimel Lamp Company, who showed a variety of brackets. Their splendid lamp was also on view under opal reflectors and fancy globes. A 3-light chandelier, fitted with Deimel lamps, completed a very pretty show. As usual, the Stott-Thorp reflex sunlight burners were in evidence, and showed to considerable advantage.

The largest display of gas appliances was made by Messrs. Richmond and Unsworth—the collection of nine "Model" cookers of various sizes being very attractive; while a score of heating-stoves in various shapes and sizes were in themselves an advertisement for this new and rising firm. Among their novelties are their grills, or rather miniature cooking-stoves, which found particular favour. Some of these small stoves are not more than 12 inches high, and are made of corrugated zinc. The remaining novelties of this firm consisted of boiling-stoves, hot-plates, smoothing-irons, water-heaters, and an assortment of enamelled ware and kettles. Messrs. Unsworth and Richmond have made a new departure by taking the sole agency for Messrs. Webb and Son, street-lamp manufacturers, of High Street, Leicester. The outside shop-lamps were indeed a speciality. An attractive stall was that of Messrs. C. Wilson and Sons, of Leeds. The "Wilson" cookers are so well known that it is needless to say anything more in their favour. Progress, however, seems to have been made in the "Elegant" heating-stove, so well adapted for drawing-rooms. The improvement is a new tubular arrangement, hidden above the burner, for consuming the products of combustion. Two new stoves of this class were fitted with Burmantofts art pottery plates; while "The Grand," made in polished brass and nickel with fender, was admired as a work of art. Mr. J. Winsborrow, inspector of the Exeter Gas Company, made an imposing display of his patent automatic gas-regulators; showing the disadvantages of unregulated gas. The next stall was that of the Thomas Lighting Company, of Carthusian Street, London. Their exhibits consisted of an enamelled factory lamp, and a "Globe" regenerative lamp. The latter was burning at 225-candle power, and equalled the electric light. Mr. J. Greenall, of Manchester, demonstrated the merits of his steam washer; and the demand was so great that the Exeter Gas Company allowed these appliances to be let on hire to consumers. Messrs. J. Wright and Co., Limited, occupied a 60-feet stand with an excellent selection of their "Eureka" cooking-stoves. The demonstration of bread-baking attracted considerable attention; the results being most astonishing. They had also a large assortment of utensils and heating appliances. A novelty was their patent automatic stove, which cuts off the gas when the iron is taken out. A stand of importance was that of the Davis Gas-Stove Company, of Camberwell. Half of one side of the hall was devoted to the well-known "Metropolitan" enamelled cookers. Hotel, family, and restaurant grillers were all on view; as were also a large number of boiling-stoves, steamers, and kettles. The gas appliances for various trades—such as tailors', laundrymen's, and mantle-makers' stoves—were fully shown. A speciality exhibited was a large double gas roaster, capable of roasting half a ton of meat at a time. A similar roaster has been in use at the Wonford Hospital, near Exeter, for some years. As to the "Metropolitan" cookers, we were glad to learn that the Exeter Gas Company have let them out on hire for nearly twelve years; and their reputation is increasing. The Company themselves did a great deal to add to the general exhibits. They showed all Messrs. T. Fletcher and Co.'s novelties—such as oven-heaters. They also exhibited Clarke's syphon stove, the Wenham floor-warming stove, Doulton's warming-stove, the "Bower" regenerative gas-lamps, &c. Messrs. Henry Greene and Sons, of Cannon Street, made a successful show of their "Meteor" lamps; twelve of them being suspended from the ceiling, and lighting the place to general satisfaction. Their representative, Mr. Hallet (who was in attendance), exhibited the model hot-plate of Leoni's new patent non-destructible gas kitchener. This plate has advantages over other stoves by having loose burners that can be taken out at any time for cleaning. The burners are also dip-proof, so that nothing can enter the holes to cause a smell. Messrs. Greene and Sons are the sole consignees for these stoves. Messrs. A. Wright and Co, of Westminster, showed a Davy lamp and "Precision" globe-holders, globe, and covers complete.

The gas-engine industry was fairly represented; there being three competitors. The local exhibitors were Messrs. E. Seage and Son, of Exeter, who had in operation their new "Exonian" gas-engine. It is a horizontal 1-horse power motor, and appears to be exceedingly simple. Its cycle or working principle is identical with the "Otto;" and it is run by tube ignition. Messrs. Seage also showed a 5-man vertical "Otto" gas-engine. The remaining gas-engine was that of Messrs. Fielding and Platt, of Gloucester. This engine has certainly very few working parts. The design is massive; and the bearing surfaces are extra large. The speed is considerable; and on the day of the opening of the exhibition, it actually rocked on its bearings, the speed was so great. An adjoining stall was that of Messrs. Arden Hill and Co., of Birmingham, who made a splendid show. A hot closet and carving table 8 feet long, with German silver-plated covers, was much admired. A feature was the baking-table; also the japanning oven and lacquering-table. The well-known "Acme" grillers, hot-plates, and gas-fires, found many buyers among the numerous visitors.

Last, but not least, the success of the Exeter gas exhibition was due to the excellent arrangements made for Mrs. Charles Marshall's cookery lectures. A platform was erected in front of the orchestra, giving seating accommodation for 300 people. Below was an equal quantity of chairs; and twice daily these were filled with visitors, while numbers had to stand. At each demonstration, the stoves of Messrs. Wright, Sugg, Unsworth and Richmond, and Davis were alternately used. The lectures were very successful; and Mrs. Marshall is to be congratulated in carrying them through so well, especially under the trying circumstances of people walking round the exhibitors' stalls. Altogether, the exhibition reflected the greatest credit upon Mr. Padfield and his staff; and it certainly ranks among the best and most successful displays of gas appliances which have been held in the provinces.

METROPOLIS GAS SUPPLY.

Recent Appeals to the Chief Gas Examiner.

In the matter of the appeals of THE GASLIGHT AND COKE COMPANY *against the reports of the Gas Examiner at Spring Gardens testing-place, showing deficient illuminating power in the gas supplied by the Company on Dec. 27 and 29, 1890.*

The appeals were lodged within seven days after the days on which the respective reports were made. At the hearing which I gave to the parties in these appeals, Mr. Trewby appeared for the Company; Mr. Dibdin for the County Council.

The Company contended that a more accurate calculation of the observations of the Gas Examiner showed that the actual illuminating power in each case was slightly higher than the number 15·5 given in the reports. It appeared, however, that a still closer calculation of the illuminating power than that given by the Company gave it somewhat below 15·5. The matter turned on the correction for temperature and pressure. The Referees give a long table of numbers called "Tabular Numbers," each of which corresponds to a particular barometric pressure, and a particular temperature. In order to correct for temperature and pressure, the Gas Examiner takes the uncorrected number representing the illuminating power of the gas, and divides it by the tabular number which he had found. The average temperature observed on the 27th of December was 56¼°; the average height of the barometer was 30·3 inches. The nearest to these values given by the Referees' table is: For 30·3 inches pressure and 56° temperature, the tabular number is 1·020; for 30·3 inches pressure and 58° temperature, the tabular number is 1·015. Upon these data, the precise tabular number for 30·3 inches and 56·5° is 1·01875. If we retain, as the Referees do, no figures below that in the second place of decimals, we have 1·019 by adding 0·00025. If we took 1·018, we should incur the greater error of striking off 0·00075. The Gas Referees show examples of carrying out the calculations for these corrections; and in these examples they quote no figure standing below the first place of decimals.

I expressed some time ago the opinion that, in particular cases, second decimals might fairly be given; but it does not appear to me to be desirable that we should go lower in quoting the illuminating power of gas, or that we should, in those numbers, quote fractions of a thousandth part of a candle power, as we should have done by accepting the number 15·5009, as suggested by the Company.

The Company examined at considerable length the Gas Examiner who performed the tests, on the subject of the temperature of the testing-place. It appeared that no observation of that temperature was made, but that the Examiner recorded, for the purpose of the tests, the temperature of the meter. On one of the days of the tests, the meter showed a temperature 3¼° below 60°; on the other day it was 5° below 60°. The Company contended that the temperature of the room ought to have been kept at or above 60°; but that on these days it must have been below this temperature, and very little, if at all, above the temperature of the meter. They stated, as the result of their experience, that a low temperature such as that assumed to have prevailed in the room was likely to cause the gas to show a lower illuminating power than it would have shown if the temperature had been 60°.

It was stated by the County Council that the temperature of a testing-place is commonly 3° or 4° higher than that of the meter. It was also pointed out that, while no limitation of temperature in the testing-place is officially prescribed, the Referees make provision, in their Notification, for the gas reaching the testing-place at any temperature between 40° and 84°.

The Company certainly presented their case with remarkable ability; and I have given careful consideration to the evidence adduced by them. The first step—namely, that the temperature of the testing-place must have been several degrees below 60°, because the temperature of the meter was on one day 3¼°, and on the other day 5° below that temperature—was supported by the opinion of their officers; but a different opinion was expressed by experienced Gas Examiners. The second step—namely, that if the temperature of the room was a few degrees below 60°, it must have lowered notably the apparent illuminating power of the gas—rests upon a groundwork of which little is known. There is reason to believe that, in a very hot photometer, gas is liable to show a higher illuminating power than in a cool photometer; but no evidence was given to prove that an appreciable difference of apparent illuminating power is seen between gas burning in cool photometers differing only a very few degrees in temperature.

I consider that the grounds for the Company's conclusion are open to doubt, and that the reports of the Gas Examiner showing the illuminating power of 15·5 candles on the 27th and 29th of December, 1890, must be accepted.

(Signed)

March 19, 1891. ALEX. W. WILLIAMSON, Chief Gas Examiner.

The Barnstaple Town Council and the Water Company.—At the meeting of the Barnstaple Town Council yesterday week, Mr. Berry stated that complaints had been made with regard to the Water Company charging one-fifth more to persons who received a supply at higher levels in the town than consumers who lived in the lower parts; and he asked the Town Clerk whether the Company had a right to make such a charge. The Clerk said the clause in the Company's Act referring to charges was worded in ambiguous terms, and was very involved. He considered, however, that they had not the power. Mr. Roberts said it was very desirable that the powers of the Company should be set forth before the public. The Company were in a far better position than other companies now seeking Acts of Parliament; being entitled to charge upon the rack-rental, while others could only get power to charge upon the rateable value. He moved that a Committee be appointed, to inquire into the regulations and powers of the Company, with power to procure Counsel's opinion, if necessary. Mr. Seldon seconded the motion, which was carried.

THE PRICE OF GAS AT MANCHESTER.

Public Meetings of Ratepayers.

A Meeting of ratepayers was held last Friday in the Mayor's Parlour at the Manchester Town Hall, "to consider the advisability of reducing the charge for gas within the city to cost price." Professor J. E. C. Munro presided; and among those present were several members of the Town Council. The Chairman, in opening the proceedings, said it was interesting to note, according to the official returns of the Corporation, that in 1862 the price of gas was as high as 4s. per 1000 cubic feet, and that it had now fallen to 2s. 6d. He thought they all recognized that the Gas Committee had in the past shown a very wise forethought in so constantly reducing the price. It was equally interesting to notice that as the charge for gas was reduced—taking the average of a certain number of years—the profits of the Gas Department had steadily increased. When the price was 4s., the profits varied from £40,000 to £50,000. In 1889, when it was 2s. 8d., the profits amounted to £105,480. This bore out the well-known principle that the more they cheapened the price of a commodity to the consumer, the more would that commodity be consumed, and in the long run the greater would be the profits of the manufacturer. He understood from figures which had been prepared, that since 1862 a sum of about £2,000,000 had been expended in the development of the works; and at the present time the total debt upon the works in respect of money borrowed for their extension was £709,341. The value of the works, he was informed, was not less than £2,500,000, so that they had a magnificent property with a debt on it of much less than three-quarters of a million. As to the profits of the department last year, there was an unfortunate strike which seriously affected the expenditure and the profits; and they should not, therefore, take that year as a normal one. But if they took 1889—and it must be borne in mind that since that year the price of coal had risen very substantially—it would be found that there was a trade profit of more than £50,000. There were two items to which he wished to refer. One was the charge for lighting the streets, which amounted to £7874. In no sense of the term could a charge for street lighting be said to be a trade outlay in the manufacture of gas. The expenditure on street lighting was an expense not incurred in the manufacture but for the benefit of the ratepayers; and he thought they should not admit the principle that it should be deducted in order to arrive at what the real profits of the trading department were. Then there was the item for depreciation, which amounted to no less than £33,264. That item was a puzzling one, because he understood a depreciation fund to be a fund which was either actually spent in maintaining the works or passed as a reserve fund in order to meet depreciation in a future year. He had asked one or two members of the Council where the depreciation fund was; and he was inclined, from what they had told him, to come to the conclusion that it had been spent. If this were the case, then it was not a depreciation fund in the real sense of the term; and they could scarcely let that item be deducted in trying to arrive at what were the actual profits of the department. He had been informed since he entered the room that the item of depreciation of £33,000 would not be charged against the Gas Department in future years. The trading profit of £50,000 they could not expect, looking at the price of coal, to be always maintained; but there was undoubtedly a considerable margin between the cost of producing gas and the profit derived by the Corporation, and available either for the ratepayers or for the benefit of the gas consumers. The price of the gas supply to the city had very many important aspects. It bore, as they would all admit, upon the health of those districts where the people suffered so much from the smoke nuisance, because a wider use of gas for heating and cooking purposes would probably tend to diminish the use of coal, and therefore the amount of smoke produced. It had also an important aspect with regard to the supply of light to the poorer districts of the city, inasmuch as if the price were lower, it would be more generally used among the poorer classes. They all knew, also, that gas was making very rapid strides as one of the motive powers of industry in this great country; and it was said that gas at a cheaper rate would tend to the greater use of gas-engines as a motive power, and so to reduced cost of production. Upon the economic aspect of the question, there were three possible principles upon which corporations might act. They might first charge what he would call a monopoly price; but there was the objection to that principle, if they applied it to the case of gas, that they were really taxing one portion of the community for the benefit of another. Then the Corporation might charge a trade price—that was, they might charge the price which would be charged by a private individual carrying on the manufacture of gas. And, lastly, they might supply it at cost price. He understood that there was a general feeling that in the long run the Corporation should adopt the latter course. Inasmuch as the ratepayers undertook all the risk and liability with regard to borrowed capital, and inasmuch as light was one of the prime necessities of life, the Corporation should bear in mind mainly the cost price of the article. Recognizing this fact, and also that it was a great motive power coming more and more into use, and other considerations, he approved of its being supplied to the consumer at cost price. Mr. Francis Greg then proposed the following resolution: "That, in the opinion of this meeting of ratepayers, a substantial reduction in the price of gas would tend to its more general use for household and industrial purposes, and would effect a corresponding improvement in the atmosphere of the city, and thereby promote the health and comfort of the citizens. The meeting therefore requests the Council to authorize the Gas Committee to supply gas within the city at cost price—that is, at net cost after all charges for sinking fund, interest, renewals, and repairs have been made, and that the change be introduced with the least possible delay." In support of the motion, he said he believed that for the year ended March, 1890, the total production of gas at the Manchester Gas-Works amounted to 3000 million cubic feet. Putting the cost of production at 2s. per 1000 feet, he reckoned that the difference between that figure and 2s. 6d. (which was the price charged) would come to £75,000, which meant on that basis that the gas consumers of the city had paid £75,000, towards the city rates. Mr. T. C. Horsfall seconded the resolution. He said he had for many years been a member of the Sanitary Association and of various other societies which had closely studied the conditions under which the people of the city were living; and he had formed the conviction that it was a matter of enormous importance that the manufacturers and householders of Manchester should be able to obtain a supply of gas at the lowest price possible. Impurity of the air was the great obstacle in the way of the social improvement of the people; and they could do nothing until they could get this terrible evil lessened. He believed that the more extended use of gas would lessen it. Mr. H. Grimshaw, who supported the resolution, said Leeds could produce gas at 1s. 10d. per 1000 feet, Halifax at 1s. 11d., and Sheffield at 1s. 10d.; while the Plymouth Gas Company could sell it at 1s. 9d., and pay a dividend of 10 per cent. He thought Manchester, which was in the centre of a coalfield, should be able to do what these places did. Dr. Ransome expressed the belief that, if gas were cheap, the poor would be encouraged to use it; and Mr. A. E. Fletcher spoke from practical experience in London of the great advantage of using gas and coke in preference to coal fires. Mr. W. Thomson, Dr. Collins, Mr. J. Sanders, and other gentlemen also supported the resolution, which was subsequently unanimously passed.

Two other meetings having the same object as the above were held during the week. The first was convened by the Ancoats Healthy Homes Society for Tuesday evening. Mr. Alderman Holland presided; and in his opening remarks, he pointed out the many advantages of having gas supplied at a cheap rate. He was not in favour of keeping up the price of gas in order to enable the charge for water to be reduced, or to avoid any raising of the price of water; for, if that policy was adopted, it would mean that the interest of the gas consumer would be sacrificed for the benefit of the water consumer, and in this matter he thought it better to saddle the right horse. He moved—"That, in the opinion of this meeting, it is desirable, in the interests not only of health and comfort, but of industry, that gas should be supplied within the city at cost price; and further, this meeting respectfully commends the wisdom of this policy to the Gas Committee of the Council." Mr. J. Sanders, in seconding the resolution, said the charge for gas was 2s. 6d. per 1000 feet; and he contended—and he thought the contention would be supported by competent authorities—that it could be produced at 1s. 6d. or 1s. 8d. without exceeding the limit of cost price. The resolution was carried unanimously. The other meeting referred to was held on Thursday evening at the Hulme Town Hall, under the auspices of the Hulme and Chorlton-on-Medlock Healthy Homes Societies, the Hulme Working Men's Sanitary Association, and the Old Trafford Public Health Association. Mr. Bax, a member of the Council, presided, and said he had advocated the principle of cost price for gas for many years, and had no hesitation in saying that the Gas Committee had been on altogether the wrong tack. The profits from gas had been handed over to the Improvement Committee; and they had badly administered them. He believed it was a fact that the Committee had received about a million of money from the gas profits; but they had done very little good with the money. The building of the Victoria Hotel from the gas funds was a standing disgrace to the city. Mr. Norris, another member of the Council, moved—"That, in view of the motion which it is understood will be proposed at the next meeting of the City Council in favour of a reduction in the price of gas, this meeting of ratepayers in Hulme desires to record its opinion that gas should be supplied within the city at cost price—that is, after all charges for sinking fund, interest, renewals, and repairs, have been met—and requests the Council to give the Gas Committee the necessary instructions for carrying out this policy with the least possible delay." Mr. Norris said he thought the price of gas should be limited to 2s. This would very much encourage trade and help to remove fetters which caused considerable inconvenience and loss. Mr. Spinks seconded the resolution. Mr. William Thomson supported it, and contrasted the price of gas in Manchester with the charges in other towns. In Derby the price was from 2s. to 2s. 5d.; Plymouth, 1s. 9d.; South Shields, 2s. 3d.; Grantham, 2s. 3d.; London, where coal cost 27s. as against 10s. per ton in Manchester, from 2s. 3d. to 2s. 6d.; Bury, 2s.; Birmingham, from 2s. 3d. to 2s. 7d.; and Leeds, 1s. 10d. Compared with these prices, the charge made in Manchester was astonishing. Gas should, in his opinion, be utilized in a far larger measure for heating purposes; and if this were done, the improvement in the atmosphere would be very marked. He further contended that the ammoniacal liquor produced at the gas-works could be disposed of to much greater advantage than at present. The resolution was carried.

OLDHAM CORPORATION GAS SUPPLY.

The Public Lighting of the Borough and the Price of Gas in the Out-Townships.

In the JOURNAL for March 24 last, we reported that writs had been served upon the Oldham Corporation, at the instance of the local authorities of Chadderton, Royton, Crompton, and Failsworth, with respect to the supply of gas to the street lamps and public buildings in the borough It will be remembered that, when the last-obtained Borough Improvement Bill was before the Committee of the House of Lords, it was decided that the price of gas to the out-townships included within the area of supply should be the same as charged in Oldham, and that, after a certain amount of profit was realized, the price should be reduced. Subsequent to this the Corporation resolved to light the street lamps and municipal buildings free of charge—a decision which was altogether unfavourably looked upon by the out-townships. They therefore determined to test its validity; their principal claim being that, in ascertaining the profits of the undertaking for the purposes of the Act of 1886, there should be taken into consideration the value of the gas used by the defendants for street lighting and other public purposes within the borough. In reply to the writs, a statement of defence has been prepared on behalf of the Corporation, the main portions of which are as follows: 1. The Corporation admit that since the coming into force of the Act of 1886, they have consumed gas in the street lamps, markets, and public buildings within the said borough, and that they have not brought the value of such gas into their account

of profits made out of the gas undertaking for the years ended March 25, 1888, 1889, and 1890; but they deny that their omission so to do was improper or contrary to any Act of Parliament. 2. For the purpose of this action, they are willing to admit that the annual value of the said gas is £6000. 3. They deny that the value of the gas is "profits" within the meaning of the Act of 1886, or that they must so treat it in their accounts. 4. They deny that the Local Boards have been deprived of any benefits to which they were entitled under the Act of 1886, or that they have reduced the profits of the gas undertaking improperly. 5. They deny that, if they light the borough with gas for public purposes without bringing the value thereof into their account of profits, they must supply gas gratuitously for such public purposes to the Local Boards within the limits of their Gas Acts. 6. Since the coming into force of the Act of 1886, the defendants have supplied and sold to the plaintiffs gas for the lighting of the streets and public buildings within their respective districts on terms agreed on within the provisions of sections 98 and 99 of the Oldham Borough Improvement Act, 1865. 7. The defendants contend that, under the Act of 1865 and otherwise, they have a discretion to light with gas the streets and public buildings within the borough without bringing the value of the gas so consumed into the account of profits made out of the gas undertaking, and without at the same time supplying gas gratuitously for the lighting of the streets or public buildings beyond the borough and within the gas limits. 8. By the Oldham Borough Improvement Act, 1865, it is enacted as follows: Section 5. "This Act shall . . . apply to and within the borough exclusively." Section 292. "In case the borough fund is at any time insufficient to pay the expenses aforesaid [being the expenses] referred to in section 291, sub-section 2, of the said Act, as set out in the statement of claim the Council shall from time to time, annually or oftener, as and when they think fit, estimate as correctly as may be the amount in addition to the borough fund which will be sufficient to pay the expenses aforesaid, and shall raise the same by means of a rate called the borough rate, and, accordingly, such a rate the Corporation shall . . . make, assess, and levy." By the operation of the said sections 5, 291, and 292, the cost of providing the gas referred to in the first paragraph is borne by the ratepayers in the borough exclusively, and not by the ratepayers in the plaintiff townships. 9. The defendants further contend that the statement of claim does not disclose any cause of action.

EDINBURGH AND LEITH GAS COMMISSION.

Improvements in the Distribution System—Proposed New Gasholder—The Engineers' Monthly Reports.

At the Meeting of the Edinburgh and Leith Gas Commission yesterday week—Provost AITKEN, of Leith, presiding—the members had before them the question of improving the distribution of gas in the outlying districts to the west and south-west of Edinburgh. The Engineer of the Edinburgh works (Mr. R. Mitchell) reported that, having carefully considered the location, also the delivering capacity of the existing trunk mains, he found there were none of them that could be extended which would in a satisfactory manner meet the growing requirements of the districts in question. To meet the demands, he recommended the laying of a new trunk main of 24 inches diameter from the present filling main, which goes to the holders at Tanfield, Cannonmills; the connection being made at the intersection of George and Hanover Streets, and the new main to run by George Street, Charlotte Square, and Hope Street, to the west end of Princes Street, where it would branch into two 15-inch mains, from which 10 and 12 inch mains would run into certain important thoroughfares—replacing 3 and 4 inch pipes. These extensions would improve the supply over a very large area. With necessary governor and connections, he estimated the cost of the extensions at £7500. The smaller mains of both the old Companies should be lifted where the service mains would be laid. Although in many cases it might not be considered at first sight profitable to do this, yet he considered it very undesirable to have old or disused mains left in the streets, as it would certainly lead to confusion, and would at some future date impede the progress of other public works which might require to be executed either by the Gas Commissioners themselves or the city authorities. On the subject of gasholder accommodation Mr. Mitchell reported as follows: "The present accommodation is: Gasholder in New Street works, of 65,000 cubic feet capacity. At Meadowflat, No. 1, of 1,020,000 cubic feet capacity; and No. 2, 1,050,000 cubic feet. At Tanfield, No. 1, of 410,000 cubic feet capacity; No. 2, 350,000 cubic feet; No. 3, 350,000 cubic feet; No. 4, 210,000 cubic feet; and No. 5, 210,000 cubic feet. At Reid's Close, 335,000 cubic feet. Together these gave 4,000,000 cubic feet. The necessity for having additional gasholder accommodation may be best understood by referring to the increased daily consumption during the past season. The heaviest delivery was on Dec. 12, 1890, amounting to 5,492,000 cubic feet in twenty-four hours, contrasted with the heaviest delivery of the previous year of 4,469,000 cubic feet on Dec. 24, 1889. The total available capacity is 4,000,000 cubic feet at present; thus showing a shortness of storeage capacity for twenty-four hours' consumption of 1,492,000 cubic feet. As the securing of suitable ground and the construction of a tank and erection of a gasholder would probably take two years, this matter requires your most careful consideration. I am of opinion that no time should be lost in having this important extension of plant decided upon and, if possible, given effect to. The size of the holder, I would suggest, should not be less than 200 feet in diameter, outside lift 30 feet deep; inside lift 198 feet in diameter by 30 ft. 6 in. deep, and having a total capacity of about 2,181,000 cubic feet. The tank necessary for this holder would be 202 feet in diameter by 20 ft. 4 in. to the top of the rest stones, and to the bottom of the tank 8 inches deeper; being 31 feet deep from the level of the cope stones. To arrive at a probable cost of erection, there are many conditions necessary to be taken into consideration—the nature and character of the ground chosen, the distance from a depôt for the excavated material, &c. Taking it that a fairly good and suitable piece of ground was acquired, I estimate the probable cost at from £38,000 to £40,000. With reference to the foregoing proposed extension, one very great advantage would be derived—viz., that the districts could be supplied with a sufficient supply of gas at a very much reduced initial pressure, thereby tending to reduce the leakage. We may also expect this from the discontinuing of the duplicate mains which are found in almost every street in the older part of the city. The work of lifting the old and duplicate mains has been going on for some time, and is still being proceeded with. During the approaching summer, I expect to have all the South Side of the city overtaken, and the distribution from one set of mains completed."

The Commissioners agreed to carry out the extension of the trunk mains, but postponed consideration of the proposal to erect additional gasholder accommodation. The offer of Messrs. R. Laidlaw and Sons for the supply of the necessary pipes for the extension of the mains was accepted.

The Engineers' monthly reports showed that the output of gas from the Edinburgh works in March was 85,313,000 cubic feet, an increase of 7,344,000 feet over March, 1890; and that from the Leith works the output was 37,243,000 feet, a decrease of 1,735,000 feet. The wages in the carbonizing department of the Edinburgh works amounted to £2682, as compared with £2105 in March, 1890; and in the Leith works to £959, as compared with £864. In the Edinburgh works 9064 tons of coal, costing £8350, were carbonized, as compared with 7951 tons, costing £4594; and in the Leith works, 3738 tons, costing £3149, were carbonized, as compared with 3886 tons, costing £2265. The quality of the gas was, in Edinburgh, 26·39 candles, as compared with 27·83 candles; in Leith, 24·51 candles, as against 27·18 candles.

Mr. WELLS moved that in future the Engineers be required to report monthly, in addition to the information they give at present, as to the quantity of gas produced per ton of coal, the cost of coal per 1000 cubic feet of gas made, the cost in salaries and wages per 1000 cubic feet, the average price of coal per ton, and the cost of lime and wages for purification per 1000 cubic feet.

Mr. KINLOCH ANDERSON seconded the motion.

Mr. POLLARD said the proposal would involve a great deal of trouble; and he would like to know what purpose was to be served, seeing they obtained these results at the end of the year.

Mr. WELLS explained that he had purposely avoided going into the matter, because, when they procured the amended information, members would be convinced that the proposal was a good one. He had noticed, by the annual report, that there was a difference of about 35 million cubic feet made from the same quantity of coal. Too much had been said at their meetings about the quality, without saying anything about the quantity of gas; whereas his opinion was that it was the quantity more than the quality they had to look to. The difference represented something like £4600—that was to say, had the same quantity of gas been made in Leith, the saving in coal would have been equal to £4600. He found the difference in wages was the same; the difference in the year's working being £12,000. At Leith each retort carbonized 28 tons 15 cwt., in Edinburgh, 24 tons 13 cwt.

Mr. KINLOCH ANDERSON said he was sorry that Mr. Pollard asked Mr. Wells for his reasons. He should have preferred that these statements should have been first put before a Committee and verified, instead of being laid before a public meeting. It might or might not be that more gas was obtained in Leith than in Edinburgh. He was not prepared to discuss it; but on Jan. 26 of this year a statement was made by the respective Engineers, according to which the gross cost per 1000 cubic feet of the gas made was at the Edinburgh works 20·78d., or as near as possible 20¾d., and in the Leith works 22·12d. or 1¼d. per 1000 cubic feet more in Leith than in Edinburgh. He knew, however, the Engineers were prepared to justify their figures, because of some extraordinary work which was going on at Leith.

Mr. WELLS said he had gone no further than the carbonizing department.

The motion was agreed to.

The Commissioners also passed a new scale of discounts, under which the rate of discount increases with the amount of the account; being 2½ per cent. for accounts between £50 and £100, and 10 per cent. for accounts above £800. The new scheme, it was reported, would raise the amount given as discounts from £1830 to £3000 a year.

THE PUBLIC LIGHTING OF THE CITY OF LONDON.

The Engineer and Surveyor to the Commissioners of Sewers of the City of London (Mr. W. Haywood, M. Inst. C.E.) has presented a report on the works executed by that body during the past year. Referring to street lighting, he states that tenders were received from The Gaslight and Coke Company for lighting the public lamps with gas for twelve months from Jan. 1, 1890; the price charged being 2s. 2d. per 1000 cubic feet of gas consumed. The following are details of the tender: Square lanterns, furnished with burners consuming 5 cubic feet of gas per hour, and in use for 4300 hours per annum, £3 4s. 7d. per lamp; being £2 6s. 7d. for gas, 15s. for lighting, and 3s. for repairing. Circular lanterns (similar conditions), £3 8s. 10d.; being an additional charge of 4s. 3d. for extra trouble in cleaning and repairing. Square lanterns, furnished with burners consuming 10 cubic feet of gas per hour (lighting hours as with the other lamps), £5 11s. 2d. each; being £4 13s. 2d. for gas, the remainder for lighting and repairing. Circular lanterns, £5 15s. 5d. each; the additional charge being for cleaning and maintenance. The number of defective gas lights observed during 1890 was 685. These returns are made to the Commission daily by the City Police, and include only those lamps in which defective lighting is very noticeable. This number is larger than usual; and Mr. Haywood says it may be accounted for by the very severe weather experienced during the latter portion of the year. The 36 meters attached to the public lamps in various parts of the City show that the full contract quantity of gas is given at those lamps. The Inspector of Gas Lighting, as well as the Inspectors of Pavements, are of opinion that the regulators of the lamps generally are kept in proper condition, and that the quantity of gas contracted for is furnished by the Company at all the public lamps. Owing to the inconvenience to the traffic caused by the fogs, the Company, acting upon the instructions they have had for many years past to light

the public lamps when fog or darkness ensues, lighted the gas-lamps during the daytime on 14 different occasions. The experimental lighting by gas of Cheapside, the Poultry, and other important thoroughfares, comprising 112 lamps in all, with burners varying in consumption from 8 to 17 cubic feet of gas per hour, was continued throughout the year, at the expense of the Company; and the results in lighting the streets sufficiently are acknowledged by Mr. Haywood to be very satisfactory. The other thoroughfares of the City are, he says, lighted sufficiently for all the purposes of the traffic, although perhaps some of them are not so for beauty of effect.

With regard to electric lighting, none of the public ways of the City were lighted by electricity during the past year. On the recommendation of the Streets Committee, on Dec. 3, 1889, it was resolved that a contract should be entered into with the Brush Electrical Engineering Company for lighting the central district of the City by electricity. On the 28th of January last year the Committee brought up a report recommending that, "inasmuch as the Laing, Wharton, and Down Construction Syndicate are prepared to light a section of the City on the same terms as agreed with the Brush Electrical Engineering Company, a contract be entered into with the said Syndicate for lighting the eastern district; and it was referred to the Solicitor to prepare the contract. On the 28th of the following month the Committee reported relative to certain proposed modifications in the contract with the Brush Company, and recommended "that the option of renewing the contract for public lighting after the first 21 years be mutual, but that the proposal to limit the power of purchase to public lighting, and the proposed deduction of interest on capital be resisted." They further advised that the proposed contract should be conditional on the Company obtaining a Provisional Order and all necessary way-leaves. This was agreed to, and referred to the Solicitor. On the 18th of March, the Committee again reported with reference to certain modifications in the contracts for the central and eastern districts; and at a special meeting held on the 25th of the month, these modifications were considered and finally agreed to. The modifications were as follows: "That the Company have way-leave in subways for private supply, nothwithstanding the contract for the public supply may have been determined. That the private supply be exclusive for 21 years, whether the contract for the public supply be determined or not. That as regards the remedy of defects found on inspection, the penalty be not enforced if the work of repair be commenced within 24 hours, and be proceeded with diligently to the satisfaction of the Engineer. That, as regards the sliding scale, 7½ per cent. per annum be allowed for depreciation, on the capital sunk in the plant and machinery, and 5 per cent. per annum of the profits available for dividend for a reserve fund, until such fund amounts to a quarter of the paid-up capital. That though the purchase of the undertaking for the public supply at 21 years be under the Act, the purchase of the private supply at 21 years be by agreement or arbitration; the purchase of either at 42 years to be under the terms of the Act." At this meeting the Committee were authorized to visit the electric installation at Taunton, where the work was being carried out by the Laing, Wharton, and Down Syndicate, to whom the eastern district had been allotted; and accordingly the Committee went to that town. On the 29th of April consents were given to the applications for Provisional Orders by the Brush Company for the central district, and to the Laing, Wharton, and Down Syndicate for the eastern district of the City; and these Orders were afterwards confirmed by the Board of Trade. The contract with the Brush Company for the central district was finally arranged, and signed on the 19th of May; that with the Laing, Wharton, and Down Syndicate being signed on the 28th of the same month. On the 7th of October the Committee recommended that advertisements should be issued inviting tenders for lighting the western district of the City by electricity, on similar conditions to those arranged for the east and central districts; but intimating that should any deviation from these conditions, favourable to the Commissioners, be desired by the Companies tendering, such deviations must be specifically set forth. This was referred back to the Committee to receive tenders. The requisite conditions were prepared by the Engineer and the Solicitor, assisted by Mr. W. H. Preece, F.R.S.; and, in response to advertisements, two tenders were received by the Committee on the 28th of November—one being from the Brush Company, and the other from the Electric Installation and Maintenance Company, Limited. After fully considering these tenders, the Committee recommended, on the 12th of December, that the tender of the Brush Company should be accepted. This was agreed to by the Commission, and referred to the Solicitor. This tender is based on precisely the same conditions as those contained in the contract with that Company for the central district. Application has therefore been made to the Board of Trade for a Provisional Order for this district by the Company.

The Late Sir J. Bazalgette.—The value of the personal estate of the late Sir Joseph Bazalgette, C.B., Engineer to the Metropolitan Board of Works, has been sworn at £151,228. The will has two codicils; and the Executors are the two sons and the son-in-law of the deceased gentleman—Messrs. Edward and Willoughby Bazalgette and Mr. F. R. Wickham.

Filey Water and Gas Bill.—The Chairman of Committees of the House of Commons (Mr. Courtney) has presented to the House a report on the above-named Bill, which has been promoted by the Filey Water and Gas Company for the purpose of obtaining additional capital for their undertaking. It was proved to the Committee that the profits divided among the shareholders during the past five financial years have not exceeded 3 per cent. per annum, and the shares are at a considerable discount; and that, in order to assist the Company to raise the additional capital, the shareholders have subscribed or procured subscribers to such capital to the amount of £5000 of it at par. Under the circumstances, the Committee were of opinion that the insertion of any provision in the Bill for the offer of such capital by public auction or tender would not be for the interest of the consumers, and ought not to be required; but they reduced the maximum rate of dividend upon the preference shares authorized by the Bill from 6 to 5 per cent.

MONTE VIDEO WATER-WORKS COMPANY, LIMITED.

The Annual General Meeting of this Company was held last Thursday, at Winchester House, Old Broad Street, E.C.—Mr. F. S. Isaac in the chair.

The Secretary (Mr. J. Anderson) read the notice convening the meeting; and the report of the Directors for the year ending Dec. 31 last was taken as read. It stated that the gross revenue amounted to £86,530; being an increase of £5517 as compared with the previous year. The working expenses showed a rise of £2035. The net income amounted to £53,128, as against £49,645 in 1889. After providing for interest and other charges, and adding £1998 to the fund for the renewal of buildings and plant, there remained an available balance of £28,337 at the credit of the profit and loss account. Out of this an interim dividend of 2½ per cent. was paid on the 1st of November last, absorbing £10,000, and the Directors recommended a further dividend of 2½ per cent. (making 5 per cent. for the year); placing £6000 to the special reserve fund, raising it to £60,000; and carrying forward the balance of £2337 to the next account. The quantity of water pumped during 1890 was 708 million gallons, against 634 million gallons in the previous year. The total number of services at the end of 1890 was 9746—an increase of 713. The subvention bills that fell due during the year, amounting to £11,730, were paid, and credited to revenue account. The remaining subvention bills held by the Company—viz., those maturing in January, February, and March of the current year—had also been paid; and with these the Government subvention had terminated. The exclusive character of the Company's concession had now expired; but the Directors considered that any competition for the supply of water to the city was practically impossible, in view of the great distance of any suitable source of supply, the very costly nature of the works that would require to be undertaken, and the occupation of the city by the Company's mains. The capital expenditure during the past year was heavy, consisting of further additions to the filtration works at Santa Lucia; a new covered storeage reservoir, with a capacity of 3½ million gallons, at Las Piedras; and important additions to the system of mains in the city. These works were rendered necessary by the rapid development of the Company's business. Part of them might probably, under ordinary circumstances, have been delayed for a year or two; but, in view of the termination of the concession, the Board considered it advisable to have the whole of the works in first-class order, to show that everything possible had been done to improve the service and quality of the water, as well as to meet the growing demand for it, and thereby amply justify the Company in asking for a new concession.

The Chairman, in moving the adoption of the report and accounts, expressed his gratification at the increase in the gross earnings during the past year, but stated that he regretted the Board had not been able to keep the expenses down. In view of the negotiations for a renewal of the concession, they had thought it wise to put the works in such a position as to warrant their demands for a continued monopoly being granted by the authorities; and although the capital expenditure had been heavy, they would no doubt eventually reap considerable benefit from the policy the Directors had pursued. The Company's works, he believed, were unequalled in South America; and they gave their customers a constant supply of water. With regard to the additions to the works, the storeage reservoirs had been roofed in with iron and brick work; and a new reservoir had been constructed of a capacity of 15½ million gallons. At Santa Lucia a double settling reservoir had been built, having a capacity of 6 million gallons; and also two filter-beds with a superficial area of 1200 square feet, each capable of dealing with 1,220,000 gallons of water per 24 hours. Turning to the accounts, he said that the increase in the gross revenue was £5517, which was equal to 6·8 per cent.; and the increase in the working expenses was almost in the same proportion. During the past year they had an increase of 703 in the services laid on. The number of services in 1880 was 4489; in 1889, 9043; and last year, 9746. As there were about 30,000 houses in the city, it would be seen that the Company had ample room for further development.

Mr. W. A. Jones seconded the motion, which was carried.

The Directors' recommendations as to the disposal of the available balance were agreed to; and the retiring Directors and Auditors were afterwards re-elected.

Votes of thanks to the Chairman and Directors and the staff concluded the proceedings.

ODESSA WATER-WORKS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held at the City Terminus Hotel, Cannon Street, E.C., last Wednesday—Sir Peter Spokes in the chair.

The Directors' report for the year ending Dec. 31 last stated that the water-rents amounted to £50,941, as compared with £53,092 for 1889, and miscellaneous receipts to £3313, as against £3570. The continued improvement in the value of the rouble during the year showed a profit of £3451 on exchange; and the net revenue, after meeting interest on debentures and all charges, including drawn bonds, amounted to £8555, against £10,211 for 1889. The Municipality of Odessa were still prosecuting their claim for the fine of 105,000 roubles in respect of turbid water supplied on the breaking up of the ice during the spring of 1881—the only difference being that the case was now in the Court of Second Instance awaiting decision; and the Imperial Government of Russia still resisted payment for water supplied to the garrison for the years 1884 to 1890, both inclusive, upon the ground that it was the duty of the Municipality to provide the troops with water. The question had reached such an acute stage that the Directors deemed it desirable to invoke the aid of the Foreign Office, not only for the protection of the Company's property, but also for the personal protection of their Resident Engineer.

The Chairman, in moving the adoption of the report, observed that the present meeting marked an important stage in the affairs of the Company, inasmuch as the shareholders were to be invited to consider not only the Directors' report, but also that of the Committee which

was appointed at the meeting in October last to confer with the Directors on the position of the Company. The water-rents and miscellaneous receipts had decreased, while the expenditure had very materially increased, although, owing to the improved value of the rouble over the 2s., at which it was taken for the purpose of their accounts, the net decrease on the balance of revenue account, compared with the account for 1889, was covered by £1656. The drop of £2125 in the amount received for the household collection of water-rents was owing to the reduction in price from 7 to 6 copecks per cask of 108 gallons. When they spoke of this as a reduction, they meant that, pending a final decision of the Law Courts, the Company had accepted the 6 copecks on the understanding that, if the decision should be in their favour, the payment made should be considered as only on account. The difference between the charge of 6 and 7 copecks for 1890 was £6160. Instead of showing a falling off of £2150 in the water-rents, they would have exhibited, but for the reduction in the rate, an increase of £3555 over the amount received in 1889. On the eve of the report being issued to the shareholders, the Directors received information that the Court of First Instance had decided against the Company, who had appealed; so that the matter was still *sub judice*. The expenditure on capital account during the past year had been £6449, against £17,933 in the previous year; but they proposed to hold their hands altogether with regard to such expenditure until they received better treatment from the Municipality of Odessa. With reference to the balance-sheet, since the end of the year their temporary loans had been reduced by £2500. When the Board was reconstituted seven years ago, the policy indicated was one of conciliation towards the governing body of Odessa, and it apparently worked well for a time. Negotiations were entered into with the Municipality, and were practically concluded, for amending the concession, to the mutual advantage of both parties; but at the last moment they were abruptly broken off by a vote of the Duma. The reason for this was—although it was not formally announced—that, as a preliminary to completing negotiations, the Company were desired to lay a trunk main from the Dneister to the city, a distance of 25 miles. These matters were dealt with in the report of the Committee, who were quite in accord with the Directors as to the course which had been taken.

Sir A. T. F. CLAY seconded the motion.

The CHAIRMAN, in reply to an inquiry, said there would be no further reduction in their rates until the revenue was double what it was now—viz., 1,000,000 roubles per annum.

The motion was carried unanimously.

Alderman Sir J. C. LAWRENCE then proposed the adoption of the report of the Committee, which stated as follows:

> Your Committee are unanimously of opinion that no proposal should be entertained for extending the water supply beyond the present boundary until the concession has been modified and the term extended; and that the hard and unjust clauses in the supplementary contract, obtained solely by threats of confiscation, should be cancelled. . . . . Your Committee cannot conclude their report without reference to an impression widely prevalent at Odessa that the shareholders have all along been receiving their 6 per cent. per annum. They think that the Russian Government, the Municipality, and the inhabitants of Odessa should be told in plain words that since the completion of the works the preference shareholders, instead of having 6 per cent., have only received interest at the rate per annum of 25 copecks for every 100 roubles subscribed, and that since the completion of the works the ordinary or "B" shareholders have never received any dividend at all. The inhabitants of Odessa should also know the fact that nearly one-third of the water pumped into the city is supplied without the Company receiving any payment.

He referred to various matters alluded to in the report in proof of the harsh treatment to which the Company had been subjected by the Municipality, and expressed a hope that the shareholders would sustain the position the Directors had taken up—viz., that they would not supply water beyond the boundary they had undertaken to serve, or enter into negotiations to supply any suburb beyond the boundary, unless there was, in the first instance, a modification in the concession, and some different plan laid down by which the town would act fairly and justly towards the Company. He thought the most favourable point in their position was that no further reduction could be made in their charges for a long time to come.

Mr. G. E. FRANCIS, in seconding the motion, maintained that the growth of the city of Odessa was owing entirely to the benefit which had been conferred upon it by the Company; and he spoke strongly in favour of their demanding an 8-copeck rate.

The report was unanimously adopted.

Votes of thanks were then passed to the Committee and to the Chairman and Directors.

The CHAIRMAN, in reply, stated, in answer to a shareholder, that no time would be lost in making a representation to the Foreign Office with reference to the position of the Company.

Ripon Corporation Gas Supply.—At a meeting of the Ripon Corporation Gas-Works Committee last Thursday, the Deputy Town Clerk (Mr. J. W. Kirkley) presented his report on the affairs of the Gas Department for the financial year ending March 25 last. This stated that the amount received for the gas consumed, after allowing £164 for discount, was £3721. The gross cost of gas sold was 3s. 1·184d. per 1000 cubic feet. The gross profit was £1253; and there was a balance in favour of the revenue account of £313. There was an increase in wages amounting to £54, due to the stokers working on the eight-hour system.

Extensions at the Newry Gas-Works.—The Gas Committee of the Newry Town Commissioners, having determined to extend and enlarge their works, have entered into contracts for the purpose. A new retort-house with iron roof, and the re-building and re-arranging of the exhauster-house, with other needful buildings, have been entrusted to Mr. Whellan, of Newry, at a cost of £1023. Messrs. Bryan Donkin and Co., of Southwark, are supplying two new exhausters—one of 20,000 cubic feet and one of 10,000 cubic feet per hour—with suitable engine for driving them. These extensions are expected to be completed by the latter end of July next, and will enable the Committee to encourage the use of gas for other than lighting purposes. Hitherto they have been restricted in their output.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent

EDINBURGH, *Saturday*.

Although the business before the Edinburgh and Leith Gas Commission on Monday was not of surpassing interest, one or two reflections arise upon it which show it to have been of no inconsiderable importance. In the first place, there were the proposed extensions of the plant connected with the Edinburgh works. These, as detailed in another column, amounted to from £45,500 to £47,500; £7500 being upon mains, and £38,000 to £40,000 upon gasholder accommodation. The Commissioners sanctioned the work upon the mains; and postponed the question of erecting an additional holder. It is certainly a necessity with any body supplying gas that their mains should be sufficient to carry the quantity consumed; and no one can read Mr. Mitchell's report without perceiving that in some of the districts the city must have grown to an extent which makes the existing mains altogether inadequate for their purpose. This is evident, for instance, when it is proposed in one place to lay a 12-inch main in place of a 3-inch one. The proposed expenditure upon them therefore could not be delayed. But it is the same with the gasholder. Mr. Mitchell's report makes it plain that he is 1½ million cubic feet per 24 hours short of storeage capacity; and I know of no reason why the new holder should not have been gone on with, unless it be desired that any outlay on this head should go into another year's accounts. If that be so, the work will only be delayed two or three months; but inasmuch as it will take probably two years to complete, and the holder is urgently required already, the sooner it is undertaken the better. Some of the Commissioners have the notion that the complaints which were so rife three months ago regarding the quality of the gas arose from insufficient supply; and that merely to remedy the defects in the mains will put everything right. There could not be a greater mistake. If there is not sufficient storeage, it is impossible that the available plant can be worked with profit. It is unfair to Mr. Mitchell to expect that he can give satisfaction to the consumers unless he is supplied with sufficient appliances. Looked at in the light of experience, it is manifest that during the winter, when the gas consumption was at its highest, he must have been sending out gas which was insufficiently cooled, and which could not be relied on to give the same duty at the burner, several miles away, which it did in the testing station near the works. It was a physical impossibility that the gas should have been what it was intended to be, and what it would have been if the works had been properly equipped; and therefore, until a new holder is erected, or probably two, the credit of the Commissioners is likely to suffer, because, with the advent of winter, there is certain to be a renewal of complaints. In justification of this view, it is but necessary to point out that since the output has fallen to about two-thirds what it was in December, the complaints have entirely ceased; the reason being that the plant is now equal to the demands made upon it, and Mr. Mitchell is able, working under the same conditions otherwise, to give satisfaction to his customers. But it is a misfortune to the Gas Commission and its officials that the public, not knowing the real cause, ascribe the improvement in the quality to the "showing up" which was given to the "bad gas."

It is pertinent in this connection to ask why the Commissioners districted the area of supply as they did. Leith is not increasing in size so rapidly as is Edinburgh; and yet the Commissioners have given to Edinburgh not only a much larger area than Leith, but also all the districts which are most on the increase. The awkward result is that, in the Edinburgh area, during the ten months of the financial year which have passed, the output from the overburdened Edinburgh works has been about 130 million cubic feet more than in the corresponding period of the previous year; whereas the output from the Leith works, which seem quite capable of more than they are called upon to do, has decreased by 28½ million cubic feet. If Edinburgh is short of storeage accommodation and Leith is not, could not a portion of the Edinburgh area be handed over to Leith? Probably the Commissioners have, in their districting, endeavoured to adhere to the arrangement which, roughly speaking, prevailed under the Companies; and if that be the case, it shows how fortunate the Edinburgh Company were in obtaining the transfer before they required to launch into the large outlays which have since been required upon the Edinburgh works. The Commissioners have already spent about £20,000 upon renewals of retorts; and that sum, with the present proposals, will raise the amount required to put the works and plant in order to £65,500. From this sum, however, falls to be deducted a moiety proportionate to the natural increase of the output. But, on the other hand, there ought to be added the further outlay which will be necessary before the remainder of the retorts are converted into the regenerative system; and probably one of these will balance the other.

But to return to the meeting. The next item of note was the new scale of discounts. These have been considerably increased, because customers who use gas for power purposes complained that their accounts were too high. The Commissioners could not see their way to make matters easy for that section of their customers by reducing the quality of the gas, but they have done the next best thing, in agreeing to give large discounts; and though the new scale means an apparent loss of nearly £1500 a year, the policy of the Commissioners can only be commended. Another item worthy of notice was Mr. Wells's motion with reference to the reports of the Engineers. Though nothing can be said against the proposal, but rather everything in favour of it, Mr. Kinloch Anderson was certainly right in saying that the remarks which were forced from Mr. Wells in support of his motion were more suitable for committee than for the public meeting of the Commission. On the face of it, Mr. Wells made out a good case for his proposal; but it is a pity that the Engineers were not allowed to explain how the differences in cost arose. As I understand, from information I have obtained since, there are explanations which satisfactorily dispose of any disposition to found conclusions upon Mr. Wells's figures, I refrain from saying anything more on the subject. It is exceedingly satisfactory to note, as mentioned above, that the consumption of gas has increased so much—about 100 million cubic feet in the portion of the year already past—and that Mr. Cockburn, the collector, was able to report that the gas-rental had risen by £13,291 above what it was at the same time last year.

The far-reaching effect of the blow which Mr. George Livesey struck at Trade Unionism is to be seen in an incident which occurred at a meeting in Edinburgh this week. Mr. A. K. Connell, the President of the London Labour Association, is a parliamentary candidate for the Central Division of Edinburgh, on labour lines; and in an address to the electors he mentioned that he and his Association supported Mr. Livesey in his profit-sharing scheme, but that they obtained modifications which improved it. This statement, I am afraid, Mr. Livesey will not admit; but whether Mr. Connell be right upon the point or not, it was significant of the attitude of Trades Unionism towards all proposals except their own, that the reference to Mr. Livesey threw the meeting into disorder. Trades Unionists could not abide to hear of the success of Mr. Livesey's scheme; and when Mr. Connell stated that it had placed £12,000 in one year to the credit of the men, some person in the hall replied that it had only added 9½d. per £1 per week to the men's wages. At this distance, I cannot say whether or not the latter statement is correct; but from the above statements, and others which were made, it is clear that Trades Unionists look upon the South Metropolitan Gas Company's scheme as inimical to their cause—the reflection on which is that, if it had not been successful, there would have been no occasion to exhibit any feeling over it.

The financial year of the Dundee Gas Commission closed on Thursday; and everyone connected with the undertaking must feel gratified with the result of the year's working. As yet the gas-rental for the whole twelvemonths has not been announced; but for the eleven months ending on March 31, it amounted to £63,336 12s. 6d., an increase of £8083 4s. 2d. over the amount collected in the same period of the previous year. The consumption of gas for the whole year was reported to the Works Committee yesterday to have been 470,381,700 cubic feet, an increase over last year of 48,432,900 cubic feet. In no previous year in the history of the Gas Commission has the increase been so large. The quantity of coal which it was estimated would be required at the works was 42,157 tons; but the actual quantity used was 48,774 tons, or an increase of 6617 tons over the estimate. It is expected that fully 50,000 tons of coal will be required for this year. At the meeting of the Works Committee yesterday, it was resolved to recommend that the illuminating power of the gas should be continued at from 25 to 26 candles.

Messrs. Dobbie, Sons, and Co., Leith, who are the contractors for the residual products of the Dundee Gas-Works, have intimated a claim upon the Gas Commissioners for loss arising out of the railway strike in Scotland. They state that the Commissioners, being unable to remove the residuals from the works, used the tar for firing purposes, which resulted in a loss to them; and also that inferior coal was used in the gas-works, which, in carbonizing, did not produce the same quantity or quality of residuals which they ought. They were not, they say, responsible for the strike; and they consider that any loss arising through it should not fall upon them. The claim is under the consideration of the Works Committee of the Gas Commission.

In Aberdeen, as in Edinburgh, there is necessity for increasing the storeage capacity of the gas-works; and the Corporation Gas Committee met on Thursday to consider the subject. It was stated that, with the present number of holders, the storeage at midwinter is less than sufficient for twenty-four hours, and that with the growing population, and in view of the extended boundary, an addition is urgently required. The Committee resolved to approach the Trades' Hospital, and make an offer to purchase between 10 and 11 acres of ground at Gallowhill, north of Trinity Cemetery, at the price of £2180. This is the only site available near the city; and it fulfils the condition that no gasholder shall be erected, without consent, within 300 yards of any dwelling-house. Should the ground be secured, two gasholders will be built, at a cost of about £20,000; and the work is expected to be completed within two years.

From our Glasgow Correspondent.

GLASGOW, *Saturday.*

In the arbitration which is to take place in connection with the transfer to the Police Commissioners of Lockerbie of the local gas-supply undertaking, under the provisions of the Burghs Gas Supply (Scotland) Act, 1876, Mr. M'Gilchrist, of the Dumbarton Corporation Gas-Works, will, I believe, have a prominent position. When this transference is completed, there will be, I think, at least sixteen gas-supply concerns in Scotland that have become municipal property in accordance with the terms of that parliamentary enactment.

The special meeting of the Dumbarton Town Council (sitting as the Gas Commission), to which I referred in last week's "Notes" as having just then been held, seems to have brought out a sort of "full-dress" debate. All the members of the Gas Committee had been in favour of the Glasgow Trust becoming the lawful gas authority in the area of supply occupied by the Dalmuir, Bowling, and Old Kilpatrick Gas Company, whose works were about to pass over to the Glasgow Gas Corporation along with those of the Partick, Hillhead, and Maryhill Gas Company. One of the members of the Dumbarton Gas Committee, however, subsequently "resiled" from the resolution to which he had agreed, and his defection encouraged other members of the Council to become objectors and obstructionists; and the result of the special meeting was that the eloquence and clear grasp of the whole subject displayed by Provost Baptie went for nothing. Several members of the Council seemed to think that in the proposals of the Glasgow Corporation Gas Committee, as explained on the spot to the Dumbarton Gas Committee by a deputation, there was concealed some sinister purpose; and in two or three instances they hinted that the Corporation of Glasgow should pay some money consideration to Dumbarton for the right to come within the area of gas supply allotted to it by Special Act of Parliament. The Provost in vain endeavoured to show to his colleagues that Glasgow was not going to get any pecuniary benefit by extending the gas-mains to Dalmuir and Bowling, and that Dumbarton was never likely to extend its gas-piping over the two miles of territory lying between the burgh boundary and the nearest gas-main on the Bowling side. Meanwhile, the Bill, as amended and approved of by the Glasgow Corporation Gas Committee and the Directors of the Partick, Hillhead, and Maryhill Gas Company, has practically passed through the House of Lords as an unopposed measure—certainly without any opposition being lodged or notified on the part of Dumbarton. Foolishly, the town councillor obstructionists declined to let Provost Baptie's motion (agreeing with the Glasgow terms) to pass at their special meeting last night week; and as the matter has been left over for decision to the next ordinary meeting of Council, it may then be found that the measure has gone beyond their reach in its progress through Parliament. From what I can hear, I believe that the Glasgow Gas Committee would be exceedingly glad to be quit of the Dalmuir and Bowling extension responsibility; but they find that Dumbarton cannot, and is not likely to attempt to supply with gas the area that has hitherto been covered by the Kilpatrick Gas Company's mains.

In all directions gas companies and gas corporations are preparing themselves for a material increase in the price of the coals required for the lighting season of 1891-92. Comparatively poor cannels have been advanced in price at least 2s. 6d. per ton since the contracting time a year ago; and the really rich varieties have gone up in price something like 5s. per ton. This being the case, it is not at all likely that large quantities of such cannels will be purchased by gas concerns in this part of Scotland. In a few special cases, purchases on a limited scale may be made, where it is desired to improve the illuminating power of gas got from splint coals and very inferior cannels. Such raw materials will henceforth be more and more extensively used; as the tendency with gas companies and corporations is, in not a few instances, rather to allow the illuminating power of their gas to fall a little than make a very material addition to the price of the gas. Here and there, the existing and prospective condition of things, as regards cost of coal, is causing thoughtful men to consider how it may be possible to enrich gas obtained from splint coal by means of gas obtained from mineral oil. Certainly, in the immediate future the use of splint will have to be more and more resorted to.

The Glasgow pig-iron market has gained further strength this week, due entirely to the strained position of the speculative account. There has not been a large volume of business, and outsiders are deterred from operating. A few more orders are being received for makers' iron, but principally for immediate requirements. The prospects show no appearance of improvement. Scotch warrants opened this week at 44s. 10d. per ton cash, and finished yesterday at 46s. 8d. Three more furnaces have been put in blast this week; and there are now 57 in actual operation—40 producing ordinary, 6 basic, and 11 hematite iron—against 87 at this time last year. The quantity of iron taken out of the warrant stores this week has been on a smaller scale than usual; and the shipments have also been small.

Comparatively little change has taken place in the coal trade this week. The demand for house coal has decidedly fallen off now that the spring time has actually arrived. In some instances, prices have declined during the week. It seems for the present there is not to be any reduction in miners' wages, as some of the leading coal-masters have excellent contracts running which they do not wish to disturb.

The Water Supply of Pudsey, Calverley, and Farsley.—At a meeting of the Farsley Local Board last Friday, the members empowered their representatives to confirm a previous resolution by which the Representative Committee of the three Local Boards have power to renew their offer of £12,000 for the undertaking of the Company.

Northern Coal Trade.—There has been continued excitement in the northern coal trade during the past few days; the demand from the Continent having increased, and there having been a disposition on the part of British users of coal to stock more, in preparation for any large requirements from Belgium. Best Northumbrian steam coal has risen in price from 12s. 3d. to 12s. 9d., according to the period of demand and the extent of the order. At the same time, large quantities are being sold under contract at much lower rates. Second-class steam coal has advanced to 11s.; and small steam coals are also higher—from 5s. 6d. to 6s.; there having been large sales, and comparative scarcity of this class being thus produced. For gas coal the inquiry is larger, both for export and for stock at home; and its price for ready cargoes has been raised in some cases to 10s. 6d. for best Durham coal, while other collieries ask 9s. 9d. to 10s. per ton, free on board. Gas coals are being freely sent to some of the Mediterranean ports; and heavy shipments to some Russian ports will commence shortly. Bunker coal is steady; but the supply is very large. There is no alteration in manufacturing coal. Blast-furnace coke is firmer, at about 17s. per ton free on board; but heavy contracts that have been expected for Belgium do not seem to have yet arrived. Gas coke is unaltered in price; but as the production is now rather less, the stocks are decreasing.

Sales of Shares.—At the Mart, Tokenhouse Yard, E.C., last Thursday, Mr. A. Richards sold by auction several parcels of shares in the following undertakings: *Brighton and Hove General Gas Company*—13 original fully-paid £20 shares, eight at £45 each, and five at £45 10s. each. *Gray's Gas Company, Limited*—five ordinary £10 "B" shares, at £10 10s. each. *Harrow District Gas Company*—11 original £10 "A" shares, fully paid, at £15 5s. per share; four fully-paid £10 "C" shares, at £10 10s. per share. *Romford Gas Company*—115 original £5 shares, fully paid, at £9 17s. 6d. and £10 each. *West Ham Gas Company*—67 original £5 shares, fully paid, at £11 10s. each; and 29 new ordinary £10 shares, fully paid, at £15 17s. 6d. each. *Woking Water and Gas Company*—119 fully-paid £10 shares (last dividend at the rate of 3¾ per cent. per annum, but with a maximum of 10 per cent.) at £9 5s., £9 7s. 6d., and £10 2s. 6d. per share.——The following transactions in gas and water shares took place during the past week: Five £10 "B" shares in the *Sheppy Gas Company* sold for £93 15s.; and a similar parcel for £96; ten £10 "C" shares going for £77 10s. Two £10 "B" shares in the same Company fetched £37 10s.; and four £10 "C" shares, £30. Three £50 "A" shares in the *Rochester, Chatham, and Strood Gas Company* fetched £341. Fifty £10 shares in the *Bromley (Kent) Gas Company* changed hands at figures ranging between £21 10s. and £22 10s. Five £5 shares in the *Brompton, Chatham, and Rochester Water Company* have just been purchased at £14 10s. per share; and another parcel of five was secured at £14 12s. 6d. per share. Other similar shares fetched £14 10s. each; and a new share, with £4 paid, sold for £12 7s. 6d.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May 2.*

Sulphate of Ammonia.—The dulness of the manure trade is said to be responsible for the decline in values of both sulphate and nitrate; and in consideration of this, the statistics concerning the latter at the end of April are peculiarly interesting, showing as they still do, an increase of consumption in spite of the late season. Prices of nitrate, too, compare favourably with those at the same time last year (9s., against 8s. 3d. in 1890); while sulphate strangely is rather lower than at the same period last year—an anomaly which seems to result principally from the movements of speculators. For though the market is superficially very inactive, the purchases of the dealers are exceptionally heavy; showing that, although there may be an absence of direct orders, the actual demand has not been less, but has once more drifted into the hands of those who sell on the chance of a fall. If, therefore, as low a price as £11 f.o.b. Hull has been accepted, the reason why is not far to seek. Sulphate is said to be offering at Liverpool and Leith on the same basis; and until direct orders from consumers come in competition with the buying of dealers, a recovery of prices may not be contemplated. It may, however, not be unreasonable, in view of the great improvement in the weather just setting in, to look for fresh orders within the next few days; and it may probably then be found that prompt sulphate is not plentiful.

LONDON, May 2.

Tar Products.—The production of tar is largely falling off; and the make of products is therefore proportionately less. This has affected the market to some little extent; but, notwithstanding, prices generally continue weak, and makers are anxious to sell. Curiously there is little or no demand for 50 per cent. benzol; whilst buyers of 90's are plentiful. Shipments of pitch are large; but with the advent of warmer weather, they must soon cease. There is a better inquiry for creosote; and some very large contracts, both for home and foreign requirements, have been booked during the past fortnight. This has relieved the market, which has been unusually glutted for the season of the year. Carbolic acid has not improved in value, although there seems a very good demand for it both in the way of crude and crystals. Anthracene is weak, and difficult to sell; but there is, however, no "A" quality offering. Prices ruling over the week are: Tar, 25s. to 30s. Pitch, 31s. to 34s. Benzols, 90 per cent., 4s. to 4s. 2d.; 50 per cent. (nominal), 3s. Toluol (nominal), 1s. 6d. Solvent naphtha, 1s. 6d. Crude naphtha, 1s. 3d. Creosote, 1¾d. Carbolic, crystals, 5½d.; crude, 60's, 1s. 6d. Cresol, 9d. Anthracene (30 per cent.), nominal, "A" quality, 1s. 4d.; "B" quality, 11d.

Sulphate of Ammonia.—This article goes from bad to worse, and to-day is flatter than it has been for years. Little or no business has transpired, although considerable shipments are being made on old contracts. The price is nominally quoted £11 to £11 5s., less 3½ per cent. discount; but there are no buyers at the moment. Gas liquor is selling at from 5s. to 6s. 6d. according to position.

Wigan Corporation Gas Supply.—We have received from the Engineer and Manager of the Wigan Corporation Gas-Works (Mr. J. Timmins) copies of his annual report and the abstract of the accounts of the Gas Department for the year ending the 31st of March last. These we hope to notice at length next week; but it may be stated now that the gross profit realized was £23,297, as compared with £23,205 in the preceding twelve months; the net profit being £11,111, as against £10,646. The working statement shows a remarkably close comparison with the year 1889-90; the gas sold per ton of coal carbonized being then 10,657 cubic feet, and last year 10,665 cubic feet. The capital actually invested in the works has been brought down from £1 3s. 2¼d. to £1 1s. 8¼d. per 1000 cubic feet of gas sold.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 831.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	16—17	..	6 3 6
100,000	10	,,	7½	Do. 7 p.c	10	11½—12½	..	6 0 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	100—108	−1	4 12 7
100,000	20	27 Nov.	8	Bahia, Limited	20	14—15	+½	10 13 4
200,000	5	13 Nov.	7½	Bombay, Limited	5	6¾—7¼	..	5 3 5
40,000	5	,,	7½	Do. New	4	5—5½	..	5 9 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	217—222	..	5 10 4
125,000	,,	,,	9½	Do. New	100	158—163	..	5 13 6
220,000	20	12 Mar	11½	Brighton & Hove Original	20	40—42	..	5 9 6
320,000	20	10 Apl.	11½	British.	20	44—45	+½	5 0 0
50,000	10	12 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—15	..	5 6 8
328,750	10	13 Nov.	6	Buenos Ayres (New) Limited	10	10—11	..	5 9 1
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	100—103	..	5 16 7
150,000	20	26 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	10 Apl.	13½	Commercial, Old Stock	100	258—263	..	5 4 6
130,000	,,	,,	10½	Do. New do.	100	195—200	..	5 7 6
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	121—126	..	3 11 5
557,320	20	30 Dec.	13	Continental Union, Limited	20	49—50	..	5 4 0
242,680	20	,,	13	Do. New '69 & '72	14	33—34	..	5 7 0
200,000	20	,,	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	25 Mar.	10	Crystal Palace District	100	195—205	..	4 17 7
486,090	10	28 Jan.	4†	European, Limited	10	20—21	..	—
354,060	10	,,	4†	Do. Partly paid	7½	14½—15½	..	—
5,470,630	Stck.	12 Feb.	13	Gaslight & Coke, A, Ordinary	100	240—244	..	5 6 6
100 000	,,	,,	4	Do. B, 4 p. c. max.	100	96—99	..	4 0 10
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	253—258	..	3 17 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	120—125	..	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	175—180	..	4 3 4
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	160—161	..	4 5 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	231—236	..	3 18 1
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	152—157	..	3 16 6
1,061,150	,,	12 Dec.	4	Do. 4 p. c. Deb. Stk.	100	113—118	..	3 7 10
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	122—126	..	3 11 5
908,000	,,	,,	6	Do. 6 p. c. do	100	165—170	..	3 10 6
3,800,000	Stck.	13 Nov.	12	Imperial Continental	100	234—238	..	5 0 10
75,000	5	12 Dec.	6	Malta & Mediterranean, Ltd.	5	4¾—5¼	−⅛	5 14 3
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	100	110—112	..	4 9 3
541,920	20	27 Nov.	6½	Monte Video, Limited.	20	19—20	..	6 10 0
150,000	5	27 Nov	10	Oriental, Limited	5	9—9½	..	5 5 3
60,000	5	25 Mar.	7	Ottoman, Limited	5	4—5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited.	10	3—4	−½	—
				People's Gas of Chicago—				
420,000	100	3 Nov.	6	1st Mtg. Bds.	100	95—100	..	6 0 0
500,000	100	1 Dec.	16	2nd Do.	100	93—98	..	6 2 3
150,000	10	28 Apl.	10	San Paulo, Limited	10	15¾—16¼*	..	6 1 2
500,000	Stck.	26 Feb.	15½	South Metropolitan, A Stock	100	282—287	..	5 8 0
1,350,000	,,	,,	12	Do. B do.	100	235—240	..	5 0 0
166,500	,,	,,	13	Do. C do.	100	242—250	..	5 4 0
678,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	141—145	..	3 9 0
60,000	5	12 Mar.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
						*Ex div.		
				WATER COMPANIES.				
729,221	Stck.	30 Dec.	10	Chelsea, Ordinary	100	255—265	..	3 15 6
1,720,560	Stck.	10 Apl.	8	East London, Ordinary	100	208—213	+1	3 15 2
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	140—145	..	3 2 0
700,000	50	12 Dec.	9	Grand Junction	50	113—118	−2	3 16 3
708,000	Stck.	12 Feb.	10½	Kent	100	255—265	..	3 19 3
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	240—245	..	3 17 7
406,200	100	,,	7½	Do. 7½ p. c. max.	100	195—200	..	3 15 0
260,000	Stck.	25 Mar.	4	Do. 4 p. c. Deb. Stk.	100	118—123	..	3 5 0
500,000	100	12 Feb.	12½	New River, New Shares	100	345—355	..	3 8 4
1,000,000	Stck.	28 Jan.	4	Do. 4 p. c. Deb. Stk	100	125—128	..	3 2 6
902,300	Stck.	12 Dec.	7	S'thwk & V'xhall, 10 p. c. max.	100	170—180	..	3 17 9
126,500	100	,,	7	Do. 7½ p. c. do.	100	165—170	..	4 2 4
1,155,066	Stck	12 Dec.	10	West Middlesex	100	250—260	..	3 16 11

† Interim dividend.

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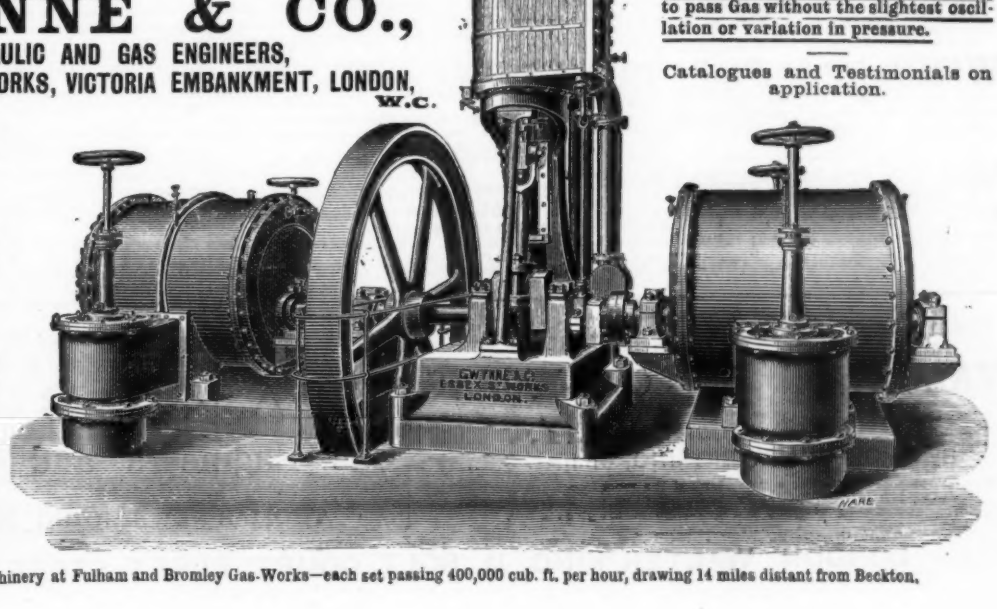

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SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 85, Gracechurch Street, LONDON; 70, Wellington Street, GLASGOW; 58, Fountain Street, MANCHESTER; and 96, Reade Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

TAR and Liquor wanted. BROTHERTON AND CO., Commercial Buildings, LEEDS.

SITUATION wanted, by a young Man (age 27), as METER REPAIRER and TESTER, at home or abroad. Five years as above in present situation. Abstainer. First-class testimonials as to character and ability.
Address No. 1942, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS MANAGERS.

WANTED, by a young Man, with experience, a situation as GENERAL HELP in a small Gas-Works.
Apply to H. BARNES, Gas-Works, Wymondham, NORFOLK.

WANTED, a Situation as Outdoor MANAGER, or any responsible position in a Provincial or Foreign Water-Works. Six years' London experience. First-class testimonials.
Address No. 1946, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Coal Merchant, AGENTS in different parts of England. State salary, &c., required, and the district in which applicant is known, and can command a trade.
Address No. 1944, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Engineering Firm, a YOUNG MAN experienced in making Drawings and taking out quantities of all kinds of Gas Engineering Plant. References to places where applicants have been similarly engaged; and state age and salary required.
Apply, by letter, to No. 1945, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 860 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1880, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock, Oldham."

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 861.
Inquiries should be addressed to THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86-88A, LEADENHALL STREET, E.C.

RAILWAY Tanks on Hire. Address BROTHERTON AND CO., Ammonia and Tar Distillers, LEEDS.

TO GAS ENGINEERS.

WANTED, by the advertiser, a situation to repair or make up New Gas Meters; also as Outdoor Inspector of same. At home or abroad. First-class references.
—Address No. 1947, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C,

WANTED, for a fortnight from the 25th of May, two MAIN and SERVICE LAYERS.
Apply, stating wages required, to the SECRETARY, Gas Company, Knighton, RADNORSHIRE.

WANTED, a steady and trustworthy GAS STOKER (Shovel charging). Permanent employment. One accustomed to Engine and Exhauster preferred. Wages 37s. per week.
Apply, stating age and experience, and giving reference, to JOHN COCKCROFT, Manager, Gas-Works, Littleborough, near MANCHESTER.

REDHILL GAS COMPANY, SURREY.

WANTED, a thoroughly active, steady, and practical WORKING FOREMAN. Must be well up in the erection and working of a Gas-Works Plant, including Engines, Exhausters, Retort-Setting, Meter Testing, Main and Service Laying, and the Manufacture of Sulphate of Ammonia. Must be a good Carbonizer, and competent to control all classes of workmen. Wages 35s. per week, with House.
Applications, in own hand-writing, stating age, with references, &c., to be sent to the undersigned.
C. READ,
Manager, &c.

NUNEATON GAS COMPANY.

MANAGER WANTED.

THE above Company require a thoroughly competent MANAGER for their Works, who must be capable of Drawing Plans and Specifications, and well acquainted with all the Machinery and Details connected with the Manufacture of Gas.
Annual make about 26 millions (rapidly increasing).
Salary, £190 per annum, with House, Gas, and Coal free.
Apply, enclosing not less than three recent testimonials, to Mr. JOHN H. BLAND, Secretary, Gas Company, NUNEATON.
Applications to be endorsed "Manager."

HERTFORD GASLIGHT COMPANY.

FOR SALE—One 6-inch Vertical CONDENSER, 25 feet high. Also a SINGLE-LIFT GASHOLDER, with Columns and Girders. Contents 10,000 cubic feet.
For further particulars apply to R. W. BRETT, Gas-Works, HERTFORD.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application.
OXIDE PAINT, SULPHURIC ACID, & Chemicals.
120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

BENTLEY & CO.

MANCHESTER ELECTRICAL STORES.

FOR Batteries, Bells, Wires, and Special Electrical Apparatus, address the best house
17, NEWTON STREET, PICCADILLY, MANCHESTER.

MR. ALFRED KITT, Consulting Engineer, 5, VICTORIA STREET, WESTMINSTER, late Engineer of the Pimlico and Westminster Stations of The Gaslight and Coke Company.

BROMLEY GAS CONSUMERS' COMPANY, KENT.

ON SALE—A 30,000 feet per hour SQUARE STATION METER AND VALVE in perfect condition, and good as new. Thrown out of use through being too small. May be seen at the Works, and all particulars obtained on application to the undersigned.
WM. WOODWARD,
Engineer.

FOR SALE—A Second-hand 8-inch CENTRE-VALVE with CONNECTIONS, complete and in good condition.
For price, &c., apply to the WATER AND GAS COMPANY, LOWESTOFT.

FOR SALE, very cheap—A second-hand patent ROTARY WASHER, in good condition. Capacity, quarter of a million per diem. Also a STATION GOVERNOR of the same capacity.
For price, &c., either as they stand, or overhauled and put in good working order, apply, by letter, to No. 1937, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—One Gasholder, 43 ft. diameter by 14 ft. deep. Capacity 20,328 cubic feet.
One GASHOLDER, 40 ft. diameter by 14 ft. deep. Capacity 17,584 cubic feet.
One Cast-Iron SCRUBBER, 14 ft. high by 3 ft. diameter.
Cast-Iron CONDENSER, 6-inch Connections.
One STATION METER, 2000 cubic feet per hour.
Four PURIFIERS in a Group, 16 ft. by 12 ft. by 3 ft. 9 in. deep; 12-inch Centre-Valve and Connections.
Would erect the above, and make practically equal to new.
Inquiries invited for various second-hand Gas Plant: Gasholders, Tanks, Purifiers, Washers, Exhausters, Station Meters, &c.
Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

CARDIFF GASLIGHT AND COKE COMPANY.

TENDERS FOR COALS.

THE Directors of the above Company are prepared to receive TENDERS for a supply of 50,000 tons of best well-screened large GAS COALS, to be delivered between July, 1891, and the 30th of June, 1892, in monthly quantities, in accordance with the specification.
Parties tendering may do so for the whole quantity or for quantities from 5000 tons upwards.
Forms of tender and specification of monthly deliveries may be obtained on application to Mr. H. Morley, the Company's Engineer.
Sealed tenders to be sent to the undersigned not later than Thursday, the 4th day of June next, addressed to the Chairman of the Company, and endorsed "Tender for Coal."
The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.
By order,
GEORGE CLARRY,
Secretary.
Gas Offices, Cardiff,
May 2, 1891.

Price 3s. 6d. post free (76 Pages, Demy 8vo., Limp Cloth),
THE
VALUATION OF GAS-WORKS FOR ASSESSMENT,
By THOMAS NEWBIGGING, M. Inst. C.E.,
With an Appendix containing a Statement of the most Important Cases bearing on the Question, and decided by the Superior Courts. Each of these is preceded by a Digest; and the Judgments are given in full.

Price: Morocco, Gilt, 18s.; Cloth, 15s.; Delivered Free.
THE FIFTH EDITION OF THE
HANDBOOK
FOR
Gas Engineers and Managers,
BY
THOMAS NEWBIGGING, M. Inst. C.E.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

CORPORATION OF HEYWOOD.

THE Gas Committee invite Tenders for the following:—

Contract No. 1—8500 tons of Gas Coal, and 500 tons of Cannel.
" No. 2—100 tons of Vitriol.
" No. 3—Cast-Iron Mains and Specials.

Specifications and forms of tender may be obtained on application to Mr. Whatmough, Gas Manager.

Sealed tenders, endorsed with the name of the articles tendered for, to be delivered to me not later than Tuesday, May 19, 1891.

By order,
ALFRED WALLIS,
Town Clerk.

Municipal Buildings,
Heywood, May 1, 1891.

COUNTY BOROUGH OF STOCKPORT.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for RETORT-FITTINGS, WROUGHT-IRON FOUL MAIN, and WROUGHT-IRON HYDRAULIC MAIN required at their Portwood Station.

Drawings and specifications may be seen, and all information obtained, on application to the Engineer, Mr. S. Meunier, Millgate Works, Stockport, on or after the 7th of May.

Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Castings, &c.," to be sent in on or before the 14th day of May ensuing.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
WALTER HYDE,
Town Clerk.

Stockport, May 2, 1891.

SOUTHEND GAS COMPANY.

TO GAS ENGINEERS AND CONTRACTORS.

THE Directors of the above Company are prepared to receive TENDERS for the supply, delivery, and erection of Two PURIFIERS 15 ft. by 9 ft., and the necessary PIPES for connecting to existing mains complete.

Also for the WROUGHT-IRON GIRDERS, PRINCIPALS, and all IRONWORK for new Roofs for Coal-Stores, and the delivery and erection of same complete.

Plans and specifications may be seen at the Gas-Works, Southend, Essex; and further particulars, obtained of Mr. F. Clark, Engineer and Manager.

Tenders to be sent, under sealed cover, addressed to the Directors, Gas Offices, Southend, not later than Friday, the 15th of May next.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
CHARLES J. DOBSON,
Secretary.

Southend, Essex,
April 27, 1891.

SOUTHEND GAS COMPANY.

TO IRONFOUNDERS AND CONTRACTORS.

THE Directors of the above Company are prepared to receive TENDERS for the supply of a number of CAST-IRON MAIN PIPES AND CONNECTIONS. Also for a 12-inch GOVERNOR, with Bye-Pass and Connections complete.

Specification and particulars as to number of Pipes and Castings can be seen at the Works, or will be forwarded on receipt of stamped envelope for reply.

Tenders to be sent in, under sealed cover, addressed to the Directors, Gas Offices, Southend, not later than the 15th inst.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
CHARLES J. DOBSON,
Secretary.

Southend, Essex,
May 2, 1891.

COUNTY BOROUGH OF BURY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation of Bury are prepared to receive TENDERS for the supply of GAS COAL and CANNEL for One, Two, or Three years, commencing on the 1st day of July next, to be delivered free at the Corporation Siding, Knowsley Street, Bury, in such quantities as may be required from time to time.

Estimated quantity, about 27,000 tons of Coal, and 3000 tons of Cannel per annum.

Full particulars and form of tender may be obtained on application to Mr. Gendall, Manager at the Gas-Works, Elton, Bury.

Sealed tenders, endorsed "Tender for Coal and Cannel," to be sent to me the undersigned on or before Monday, the 18th of May, 1891.

The Corporation do not bind themselves to accept the lowest or any tender.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bury,
April 27, 1891.

COUNTY BOROUGH OF BURY.

THE Gas Committee of the Corporation of Bury are open to receive TENDERS for the supply of 100 tons of OXIDE OF IRON for Gas Purification, to be delivered free at Bury.

Full particulars and form of tender may be had on application to Mr. Gendall, Manager, Gas-Works, Elton, near Bury.

Sealed tenders, endorsed "Tender for Oxide of Iron," to be sent to me, the undersigned, on or before Monday, the 18th of May, 1891.

The Corporation do not bind themselves to accept the lowest or any tender.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bury,
April 27, 1891.

COAL, COKE, TAR, SULPHURIC ACID, ETC.

THE Hinckley Local Board are prepared to receive TENDERS for the supply or disposal of the following GOODS over Twelve months:—

GAS COAL—3000 tons delivered in about equal monthly quantities.
CAST-IRON PIPES—2, 3, and 4 inches diameter; open Sockets.
SULPHURIC ACID—30 tons in carboys, 5-ton lots.
SULPHATE OF AMMONIA—20 tons, guaranteed to contain not less than 24 per cent. of Ammonia.
COKE—1000 tons to be taken as made.
TAR—250 tons, delivery by rail or canal into Contractor's vessels.

Forms of tender and full particulars on application.

The Board do not bind themselves to accept the lowest or highest tenders as the case may be, and reserve the right to divide the contracts.

Sealed and endorsed tenders to be sent in to me on or before May 11.

E. H. MILLARD, Manager.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Accrington Gas and Water Works Company invite TENDERS for the TAR and AMMONIACAL LIQUOR which may be produced at their Accrington and Great Harwood Works during One year, commencing on the 1st of July, next.

Production of Tar, about 690 tons at Accrington, and about 590 tons at Great Harwood. Ammoniacal Liquor, about 1650 tons at Accrington, and 1150 tons at Great Harwood.

Tenders, endorsed "Tar and Liquor," must be in my hands not later than Wednesday, the 13th inst., addressed to the Chairman, Gas-Works, Accrington.

By order,
CHARLES HARRISON,
Secretary and Manager.

May 1, 1891.

TENDERS FOR COAL.

THE Scarborough Gas Company invite TENDERS for the supply of about 17,000 tons or upwards of best screened GAS COAL or COBBLES per annum for One or Two years from the 1st day of July next.

Tenders, endorsed "Tender for Coal," must be delivered at the Company's Offices, not later than Ten o'clock a.m. on Monday, the 18th inst.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
WILLIAM J. MOON,
Secretary and Manager.

Scarborough,
May 1, 1891.

STALYBRIDGE CORPORATION.
(GAS DEPARTMENT.)

THREE-LIFT GASHOLDER.

THE Gas Committee invite Tenders for the erection of a GASHOLDER of Three Lifts. Diameter of outer lift 127 ft. 6 in.; contents, about ¾ million cubic feet.

Specification and drawings may be seen on application to the Engineer; and quantities and form of tender can be obtained on payment of the sum of One Guinea, which will be returned on a *bond fide* tender being sent in.

Tenders to be sent in on or before Tuesday, the 26th of May, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gasholder."

The Committee do not bind themselves to accept the lowest or any tender.

By order,
ERNEST A. LOAM,
Engineer.

Stalybridge Corporation Gas-Works,
April 29, 1891.

IRON ROOFS.

THE Gas Committee of the Belfast Corporation invite TENDERS for the construction of three IRON ROOFS of the following sizes, viz:—

191 ft. 9 in. by 70 ft. span.
60 ft. by 91 ft. span.
106 ft. 3 in. by 26 ft. span.

Drawings and specification may be inspected at the Engineer's Offices, Gas-Works, Belfast. Copy of specification, with form of tender attached, can be had on payment of One Guinea to be returned on receipt of a *bond fide* tender.

For the convenience of parties unable to inspect plans at the works, it has been arranged to supply a complete set of drawings and specification on payment of Three Guineas.

Tenders, endorsed "Tender for Roofs," must be lodged in the Town Clerk's Office, Town Hall, Belfast, not later than the 20th of May.

The Committee do not bind themselves to accept the lowest or any offer.

JAMES STELFOX, Engineer.

BOROUGH OF DEWSBURY.

THE Gas Committee are prepared to receive TENDERS for the supply and delivery at their Gas-Works, Savile Town, near Dewsbury, of the following quantities of GAS COAL and CANNEL, during a period of One, or of Two, or of Three years, commencing on the 1st day of July next:—

	Coal.	Cannel.
First Year . .	16,500 tons.	1,500 tons.
Second " . .	17,000 "	2,000 "
Third " . .	18,000 "	2,000 "

Tenders must specify prices for delivery by Road, or by Water, or by Rail, and be made on forms to be had on application to Mr. Chas. A. Craven, Engineer and Manager, Savile Town Gas-Works, Dewsbury, from whom any further information can be obtained.

Tenders, under sealed cover, endorsed "Tender for Coal Supply," to be sent to the Town Clerk, Dewsbury, not later than Saturday, the 16th day of May next.

The lowest or any tender will not necessarily be accepted.

By order,
ERNEST MAWDESLEY,
Town Clerk.

Town Clerk's Office, Town Hall,
Dewsbury, April, 1891.

DENTON AND HAUGHTON LOCAL BOARD.

COAL, CANNEL, AND TAR.

THE Gas Committee invite Tenders for COAL and CANNEL, and OFFERS for TAR, on or before May 9, 1891.

Particulars may be obtained from Mr. J. M. Veevers, Gas-Works, Denton, near Manchester.

By order,
JOHN RICHARDS,
Clerk to the Board.

THE Hindley Local Board are prepared to receive TENDERS for the repairing of the GASHOLDER at the Hindley Gas-Works.

For particulars, apply to Mr. Dickinson, Gas and Water Manager.

Sealed tenders to be sent to the undersigned, not later than May 18, 1891.

By order,
STEPHEN HOLT,
Clerk.

Offices: Cross Street, Hindley,
May 1, 1891.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee are prepared to receive TENDERS for the supply of about 98,000 tons of CANNEL and COAL required by them during the year ending June 30, 1892.

Specifications and forms of tender can be obtained on application to Mr. Herbert Andrew, Gas and Water Offices, Oldham, to whom tenders are to be sent on or before Tuesday, May 19, 1891.

A. NICHOLSON,
Town Clerk.

Oldham, May 1, 1891.

THE Directors of the Rochester, Chatham, and Strood Gaslight Company invite TENDERS for the supply of HYDRAULIC MAINS, ASCENSION-PIPES, and other FITTINGS for a Retort-House of 21 through Retorts. (Retort Mouthpieces and Lids not included.)

Copies of specification may be had, and the drawings seen (in usual office hours) at the Office of the Company, 58, High Street, Rochester, or any day after Wednesday, the 6th of May.

The goods are to be delivered free at the Works of the Company, at Gillingham, Kent.

Tenders to be at the Office before Noon on Thursday, the 28th day of May next.

WILLIAM SYMS, Secretary.

April 23, 1891.

LEAFLETS for Distribution by Gas Companies and Corporation Gas Committees:—

OIL OR GAS FOR LIGHTING OUR HOMES? Price (delivered free) 5s. per 100; £2 per 1000. Larger quantities by agreement. Specimen copy, by post, 1½d.

THE COMPOSITION AND USE OF GAS LIME IN AGRICULTURE. By (the late) Dr. A. VOELCKER, Professor of Chemistry to the Royal Agricultural Society of England. Price 5s. per 100, post free.

THE VALUE OF SULPHATE OF AMMONIA AS A MANURE. By F. J. LLOYD, F.C.S., Consulting Chemist to the British Dairy Farmers Association, Lecturer on Agriculture at King's College, &c. Price 5s. per 100, post free.

THE USE OF SULPHATE OF AMMONIA AS A MANURE. By WILLIAM ARNOLD, Chairman of the Tamworth Gas Company. Price 2s. 6d. per 100, post free.

Published by WALTER KING, 11, Bolt Court, Fleet Street, LONDON, E.C.

Price 2s. per dozen, or 10s. 6d. per 100, post free.

CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

SOOTHILL WOOD CANNEL.

Yield of Gas per Ton, over 12,000 Cubic Feet.
Illuminating Power - - - - - 26 Candles.
Coke per Ton, - - - - - - - 57 per cent. of a quality almost equal to that made from the best Coking Coal.

For Analysis and Price, apply to

The Soothill Wood Colliery Co., Ld.,
SOOTHILL WOOD COLLIERY,
BATLEY, YORKSHIRE.

Subscriptions will be received by Williams, Deacon, and Manchester and Salford Bank, Limited, London and Manchester and Branches, or any of the Banks named below.

The Subscription Lists will be closed on or before Wednesday, May 6, 1891, for Town applications, and Thursday, May 7, for Country.

Water-Works and Gas-Works Securities

CORPORATION LIMITED.

Incorporated under the Companies Acts, 1862 to 1890.

CAPITAL - - - - - £2,000,000,

Divided into 199,800 ordinary shares of £10 each and 2000 Founders' shares of £1 each.

ISSUE OF 99,800 ORDINARY SHARES.

THE INTERNATIONAL TRUSTEE, ASSETS, AND DEBENTURE CORPORATION, LIMITED, INVITE SUBSCRIPTIONS for the above 99,800 Ordinary Shares, payable as follows: 5s. per Share on Application, 5s. per Share on Allotment, 10s. per share 60 days after Allotment—£1.

It is intended not to call up more than £1 per share, and to constitute the remaining £9 per Share reserve capital, under the Act of 1879, no part of which can be called up except in the event of, and for the purposes of, the Corporation being wound up.

The Ordinary Shares will be entitled to a preferential dividend of 8 per cent. out of the profits of each year.

The Founders' Shares will then be entitled to half the remaining profits; and the other half, subject to provision for Reserve Fund, will be available for a further dividend on the Ordinary Shares.

The subscribers for the Founders' Shares have guaranteed the subscription of £700,000 of the capital, and pay the whole of the preliminary expenses of the Corporation down to Allotment, except the registration fees and Government duty.

Trustees.

THE INTERNATIONAL TRUSTEE, ASSETS, AND DEBENTURE CORPORATION, LIMITED.

Directors.

JOHN EWART, Esq. (Director South Metropolitan Gas Company).
Sir DOUGLAS FOX, M. Inst. C. E. (Director South Indian Railway Company, Limited).
JAMES C. FRASER, Esq. (Director Liverpool United Gas Company, Limited).
W. D. GILLIES, Esq., Glasgow (Director Clyde Coal Company, Limited).
Major J. EUSTACE JAMESON (Director Brewery and Commercial Investment Corporation, Limited).
The Hon E. JOHNSTONE (Director the New River Company).
G. E. NORWOOD RYAN, Esq. (Director Lambeth Water-Works Company).
The Right Hon. the LORD MONKSWELL, London County Council.
Sir CHARLES TUPPER, Bart., G.C.M.G., C.B., High Commissioner for Canada.

Bankers—London and Manchester: Williams, Deacon, and Manchester and Salford Bank, Limited. Liverpool: North-Western Bank, Limited. Dublin: Royal Bank of Ireland. New York: Messrs. Brown Bros. Canada: Bank of Montreal, Montreal.

Solicitors—Messrs. Wilson, Bristows, and Carpmael, 1, Copthall Buildings, E.C.

Brokers—London: Messrs. Linton, Clarke, and Co., Bartholomew House, E.C. Dublin: Messrs. Manifold and Hines, 4, College Green.

Engineers—In England: Messrs. T. and C. Hawksley, MM.Inst.C.E., 30, Great George Street, S.W. In America: Benjamin S. Church, Esq., M.Am.Soc.C.E. (late Chief Engineer of New York City and of its Water-Works).

Agents for America—Messrs Inman Bros. and Low, New York City, U.S.A.

Auditors—Messrs. Monkhouse, Goddard, and Co., Chartered Accountants, 28 and 29, St. Swithin's Lane, E.C.

Secretary and Offices (pro tem.)—Andrew W. Barr, Esq., Copthall House, Copthall Avenue, E.C.

PROSPECTUS.

This Corporation has been formed principally for the purpose of purchasing, holding, disposing of, and making advances upon the Shares, Bonds, and other Securities of Water-Works and Gas-Works and other Lighting Companies, and for obtaining and dealing with Concessions relating to such undertakings, particularly in the United States of America and Canada.

It is intended that the operations of the Corporation shall be restricted to Water and Lighting undertakings, unless otherwise sanctioned by the Shareholders in general meeting.

The Securities of Water and Lighting Companies are generally considered to offer an extensive and profitable field for investment of capital, and to be of the soundest character; such undertakings being less liable to competition than most other forms of securities. They also rank amongst the most remunerative of public works. The growth of cities, more especially in the United States, has been so rapid that many of these Companies have earned large percentages upon the capital invested; and there are at the present time numerous growing cities and towns requiring either the erection of new works or the enlargement of existing ones.

The Directors believe that the present issue of Capital can be employed in purchasing the securities of established Water and Lighting works, and in dealing with Concessions for new undertakings upon terms likely to prove both safe and remunerative; and they feel justified in anticipating that the risk will be reduced to a minimum by restricting investments to this class of Security, as is shown in the case of Water-Works Bonds by the following extracts from a manual issued by the Maverick National Bank of Boston, Mass., U.S.A., dated July 1, 1887.

> In the whole history of Water-Works, there have been but three instances of foreclosure of first Mortgage Bonds; and in these cases no loss was sustained by the holders.
>
> It is evident that no other class of Securities can show such a record of immunity from risk. This Bank has placed many loans of Water Companies, and has yet to learn of a dissatisfied investor.
>
> Water Company Bonds are a mortgage upon productive property, of which the productiveness is constantly increasing.

It is proposed, where practicable, to obtain a controlling interest in the share capital of the Local Companies, which, it is believed, will prove an important safeguard by enabling the Corporation to secure such good management as will ensure the largest return upon the capital invested.

The "Manual of American Water-Works for 1889-90" states that, during the fourteen months ending May 1 last, no less than 198 new Water-Works were completed or put under construction in the United States, of which 121 were undertaken by Companies.

As additional capital is required, the Corporation will issue Debentures or Debenture Stock on the security of its undertaking and investment. The difference between the interest paid by the Corporation on its Debentures or Debenture Stock and the interest and dividends received on investment should form an important part of the earnings of the Corporation.

The Corporation has also power to take part in making public issues of the securities of Water and Lighting Companies, to guarantee subscriptions to the same, and to negotiate the sale of securities and shares of such undertakings.

The Directors have under consideration the appointment of Boards in the United States and Canada, with a special knowledge of Water and Lighting Properties in those countries. But such Boards will act only in an advisory capacity, and whenever expedient the English Engineers of the Corporation will be called upon to report upon properties submitted for investment.

The whole of the 2000 Founders' Shares will be subscribed by, and allotted to, the new Founders' Shares Syndicate, Limited, or their nominees, who are the Founders of the Corporation, and who have, in consideration of such subscription being reserved to them, entered into an agreement with the Corporation, dated April 27, 1891, whereby they undertake to defray the whole of the preliminary expenses of the Corporation, except Government duties and registration fees, down to allotment, and guarantee the subscription of 70,000 Ordinary Shares at par.

Beyond such issue of Founders' Shares, no promotion money has been, or will be paid by the Corporation; and no contracts or commitments with regard to any properties or securities have been entered into.

The New Founders' Share Syndicate, Limited, have entered into an agreement, dated April 30, 1891, with the International Trustee, Assets, and Debenture Corporation, Limited, with reference to the present issue, and into agreements with third parties for guaranteeing the subscription of a portion of the capital offered, to which the Corporation is not a party. Applicants for Shares will be deemed to have notice of such agreements, and to have waived the insertion herein of the dates thereof and the names of the parties thereto, or any further or other compliance with Section 38 of the Companies' Act, 1867, than is contained herein.

A Stock Exchange quotation will be applied for in due course.

Copies of the Memorandum and Articles of Association and of the Trust Deed for securing Debentures or Debenture Stock can be inspected at the Offices of the Solicitors to the Corporation.

Applications for Shares should be made on the Form accompanying the Prospectus, and sent with the deposit of 5s. per share to one of the Bankers of the Corporation. If no allotment is made, the deposit will be returned in full.

Prospectuses and Forms of Application can be obtained from the International Trustee, Assets, and Debenture Corporation, Limited, 13, George Street, Mansion House; or from the Bankers, Brokers, Solicitors, or Auditors, and at the Offices of the Corporation.

May 1, 1891.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road,

CITY ROAD, LONDON, N.

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

THOMAS ILLINGWORTH,

NORTH DEAN CHEMICAL WORKS,

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MANUFACTURER OF SULPHURIC ACID

OF EXTRA QUALITY FOR MAKING

WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE

Purchased for Cash against Delivery

CAST-IRON PIPES

FOR GAS AND WATER.

Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.

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Tar Distiller and Manufacturing Chemist,

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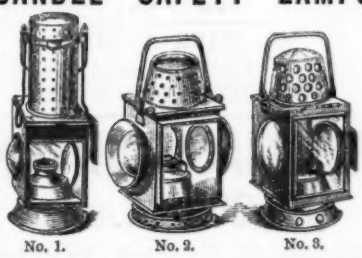

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10,000 Tons

Put on Rail at 5s. 6d. per ton.

Yield of gas per ton . . . . . 8200 feet.
Illuminating power . . 20·50 sperm candles.
Ammoniacal liquor per ton . . . . 120 lbs.
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A trial order for not less than ten Wagons from any Corporation or Gas Company before purchasing the lot will be accepted at the above price.

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effecting a great saving of time, labour, and expense.

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Prices are Reduced.

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Produce of Gas per ton - - - - - - - 10,300 feet.
Coke " - - - - - - - 13½ cwt.
Illuminating Power - - - - - - - 16 candles.

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Gas Companies are solicited to try Samples of the

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BLACK BED GAS COAL.

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The Divisions in the Revolving Discs are filled with

"WOODEN CLUSTERS"

(As patented by them in 1883).

Also tubes for raising and distributing Liquor over the Clusters.

Efficient in action and small driving power.

Patent four-blade exhausters to pass from 50,000 to 500,000 feet per hour.

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EXISTING EXHAUSTERS ALTERED TO PASS AN INCREASE OF 30 TO 50 PER CENT.

Using the same Valves, Connections, and Driving Power.

FRICTION 25 PER CENT. LESS THAN OTHER EXHAUSTERS.

THE DELIVERY OF GAS BEING MORE DIVIDED EACH REVOLUTION, THE GAUGE IS MORE STEADY.

Model of Four or Three Blade Exhauster on application.

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Shipping Ports: All the principal Scotch Ports.

HOLMSIDE GAS COALS.
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PRESENT production nearly 3000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16½ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves 69 per cent. of excellent Coke. During the year 1890, the London Gas Companies carbonized about 400,000 tons of HOLMSIDE COALS. They are used by The Gaslight and Coke Company, the South Metropolitan Gas Company, the Woolwich (Government) Gas-Works, the Newcastle and Gateshead Gas Company, the European Gas Company, L'Union des Gaz, and by many other Gas Companies both at Home and Abroad.

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Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
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Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles
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EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
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RETORT SETTINGS IMPROVED
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Estimates and Particulars for every Description of Retort Extensions and other Work.

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VARIOUS SIZES ALWAYS IN STOCK.
Flanges made to suit requirements.

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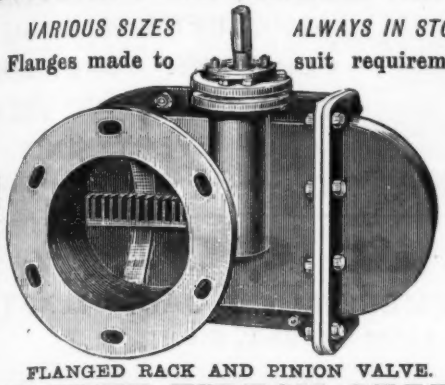

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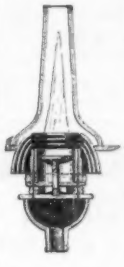

Burners upon the "Douglass" principle are now on the market for ordinary purposes as used by the Government and at the following Lighthouses: The Eddystone; Dungeness; Whitby Scilly Rock; and many others.

GIVE A PURE WHITE AND BRILLIANT FLAME.
Without Smoke or Chimney Breakage.
CONSUME LESS GAS, and give a more POWERFUL LIGHT than any other Burner yet devised.
SIZES FROM 15 TO 3000 CANDLE POWER.

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Patent Safety Gas Apparatus,

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fixed in any part of the house most convenient for use, gives immediate and full control of the Gas throughout the premises, enabling the user to turn the supply on and off, and regulate its admission to the meter as required.

The **Apparatus** combined with **Pressure-Gauge** or **Locking Appliance.**

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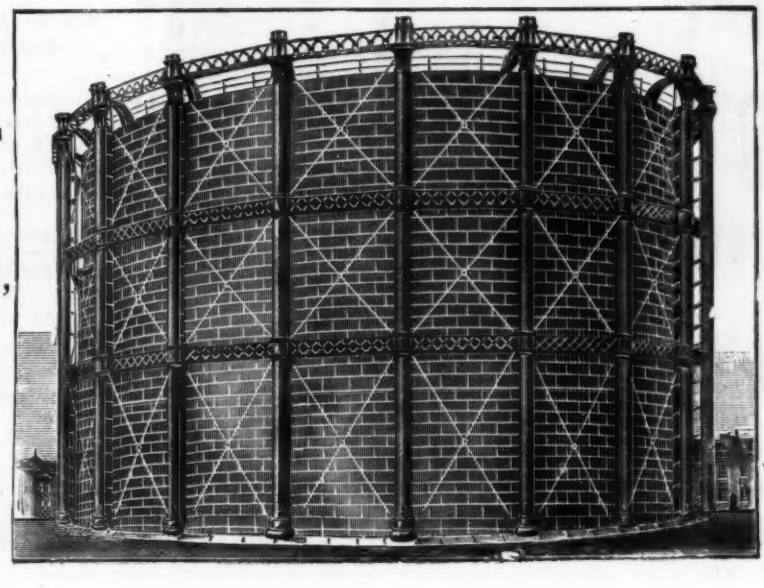

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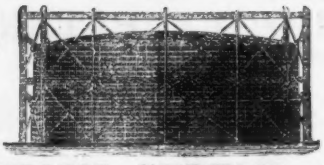

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PLANS and SPECIFICATIONS furnished for **Extensions** and **Enlargement** of existing **Works,** adapting them to the most **Improved** and **Modern Principle** of **Gas Manufacture.**

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Special reference and attention are invited to our

WET AND DRY METERS,

which have acquired a high reputation for the **excellence** of Materials and Workmanship; their **durability** and **accuracy** of **Register** guaranteed. They are used by several of the **London Gas Companies,** and over **200 Provincial Gas Companies.**

Price Lists, Specifications, and Estimates provided for any work appertaining to Gas Lighting, from the Retort-House to the Drawing-Room.

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Manufacturers of

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FOR

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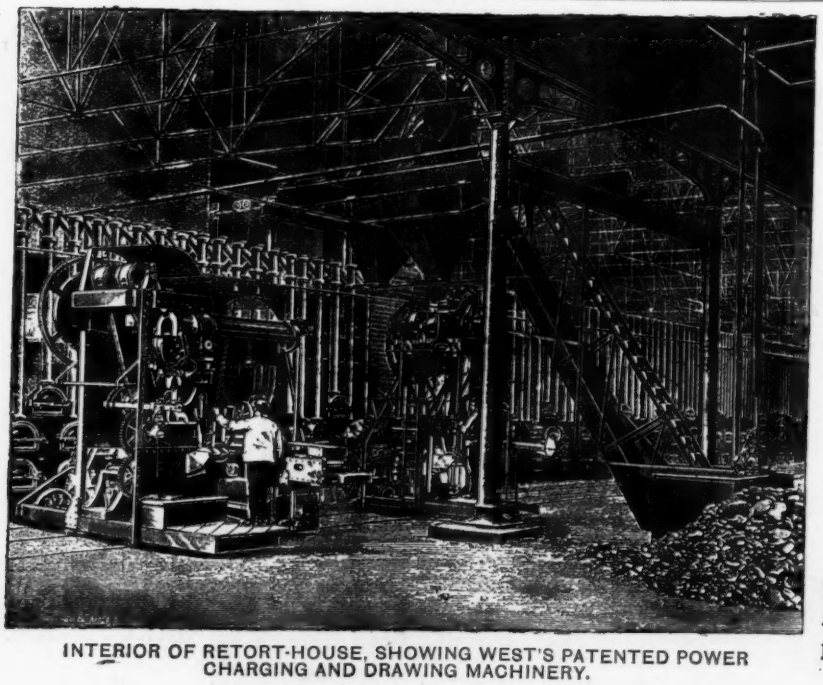
OVER **180** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.



INTERIOR OF RETORT-HOUSE, SHOWING WEST'S PATENTED POWER CHARGING AND DRAWING MACHINERY.

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES.

COAL BREAKING, ELEVATING, AND CONVEYING MACHINERY.

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RETORT MOUTHPIECES
WITH SELF-SEALING LIDS,
FITTED WITH
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PATENT FASTENINGS.

N.B.—The whole of these Fittings are made of Wrought Iron.

AUTOMATIC SYSTEM OF CHARGING & DRAWING INCLINED GAS-RETORTS.

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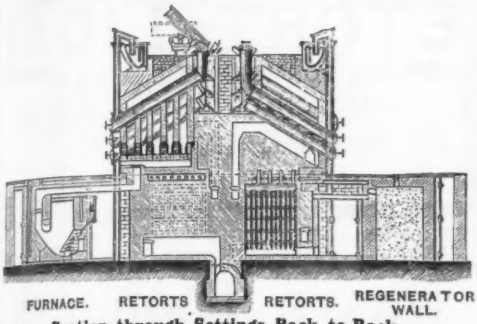
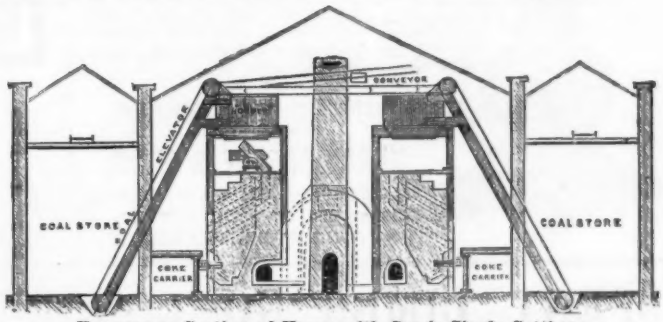
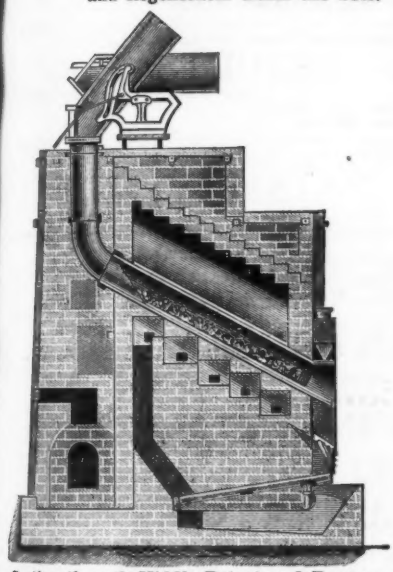
This System of Automatically Charging and Discharging Retorts without machinery or arduous labour is in operation at several places on the Continent and in America, and will shortly be at work in various Gas-Works in England.



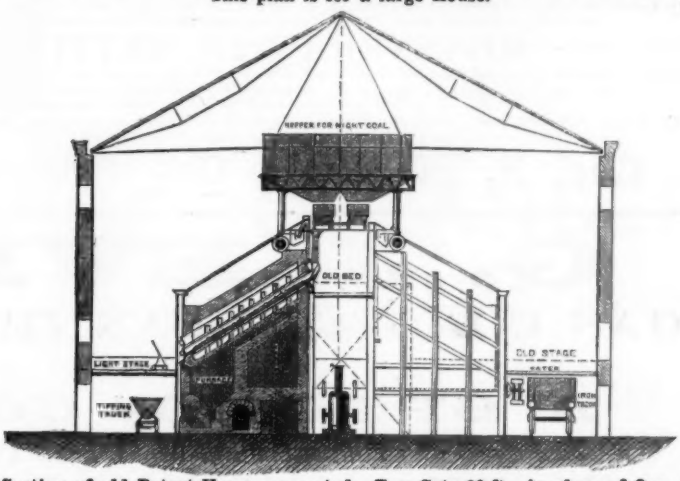
Section through Settings Back to Back.
Working off ground floor with Generator under Stage and Regenerator under the Sets.



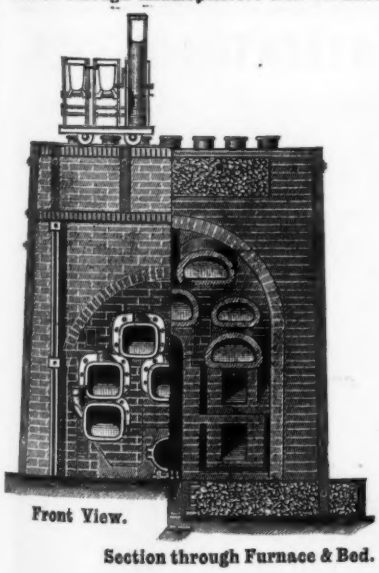
Transverse Section of House with Coze's Single Settings, Showing Method of working Two Single Settings and Distributing the Coal to the Supply Hoppers; the whole of the work being Automatic. This plan is for a large House.



Section through Middle Retort and Furnace.

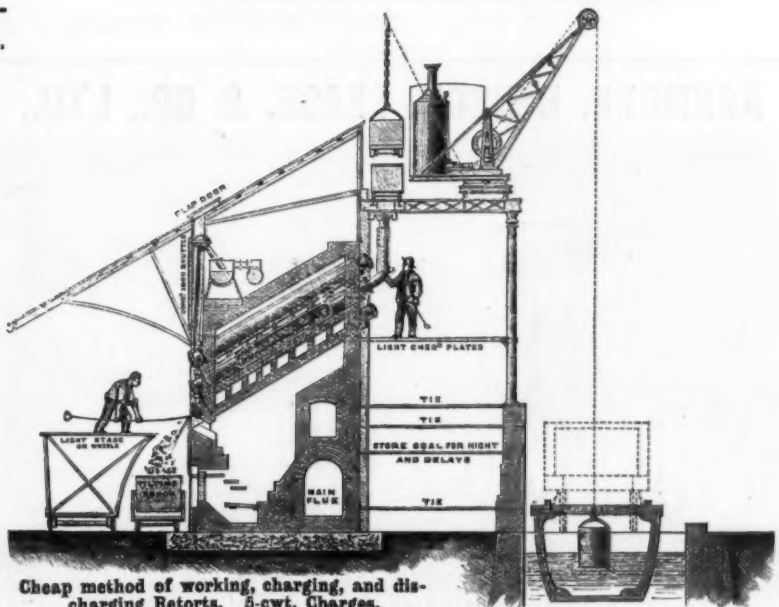


Section of old Retort-House converted, Two Sets 20 fts. in place of One. Modified form, with ordinary Retorts and Fittings.



Front View.

Section through Furnace & Bed.



Cheap method of working, charging, and discharging Retorts. 5-cwt. Charges.
Section through Setting, Front to Back. Coal Barge or Railway.
Light Corrugated Roof over Sets and at Sides.

These Systems are fully Patented, and any Infringer will be strictly proceeded against.

For further particulars apply to **W. M. KIGHT**, Secretary of **THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86 and 88A, LEADENHALL STREET, LONDON, E.C.**

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NEW HIGH-POWER GAS-LAMP.

Westphal's Patent.

Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

Particulars and Prices Free.

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MAKE

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OF ALL FORMS AND SHAPES
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PRICES ON APPLICATION.

SPENT LIMES NO LONGER WASTE PRODUCTS.

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All Spent Limes are most effectually, economically, and continuously recovered, and at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it. Descriptive Pamphlet and Terms from Agents as under.

— REGENERATIVE SETTINGS OF RETORTS. —

Hislop's Patent Producer and Patent Charging Appliances offer advantages which are unapproachable, while in every other detail his Settings are confidently recommended as being the most inexpensive and effective possible.

Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

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PATENTEE OF

A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

PRICE AND PARTICULARS ON APPLICATION.

Head Office: CORPORATION STREET, BIRMINGHAM.

ASHMORE, BENSON, PEASE, & CO., LTD., STOCKTON-ON-TEES.

TELEGRAMS "Gasholder"
SIMPLE IN CONSTRUCTION
EFFECTIVE IN RESULTS
MAKERS OF LARGEST GAS HOLDER IN THE WORLD
ASHMORE BENSON PEASE & Co
STOCKTON-ON-TEES
SULPHATE PLANT
DAVIS' PATENT
ECONOMICAL IN COST & SPACE
STILLS IN STOCK 2 3 & 4 FEET DIA.
MAKERS OF
ALL GAS PLANT &
Every kind of Constructional Ironwork
OIL GAS PLANT FOR WORKS VILLAGES & MANSIONS
PEASE'S Patent WIRE ROPE SYSTEM
for Guiding Gasholders. Effecting a Saving of 25 per cent in Cost

D. HULETT & CO., LTD.,

GAS ENGINEERS,

55 & 56, HIGH HOLBORN, LONDON,

Manufacturers of every description of Gas-Fittings.

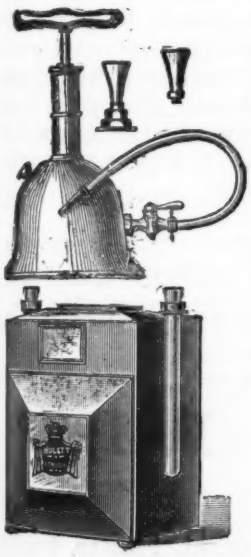
HIGH-POWER LAMPS

Of every description, fitted with Copper Tops, Porcelain Cones, and Regulating High-Power Burners.

HULETT'S PATENT

STREET LAMPS.

No putty required.
Glass secured by hinged clips. No loose parts.
A new pane of glass can be fitted in a few minutes by any inexperienced person.
Glass can be supplied cut ready for use.
The frames are not liable to be damaged as in ordinary lamps when hacking out a broken pane of glass.
The glass can be removed for repainting.
Several thousands of these are now in use, giving general satisfaction.
They are strongly made, and of the best material.



HULETT'S IMPROVED

SERVICE CLEANSER

For Removal of Obstructions in Gas Service Pipes.

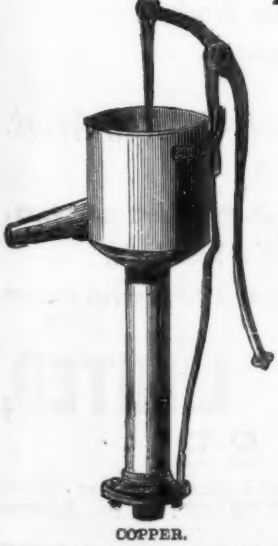
They are constructed with Air Vessels of great strength and capacity for storing a large quantity of air, which can be delivered at a pressure of 150 lbs. if necessary.

They are also fitted with Water Fittings, so that about a gallon of liquid can be discharged with the air, for removing Naphthalene from the interior of tubes.

WET AND DRY GAS-METERS.

GAS PRESSURE GAUGES.

WROUGHT OR CAST IRON TUBES AND FITTINGS.

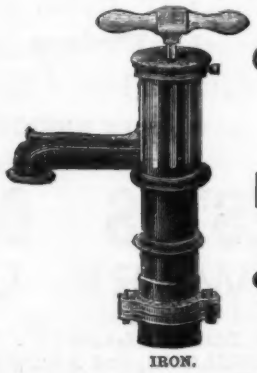


COPPER.

BRASS.

SYPHON PUMPS,

In Iron, Brass, and Copper.



IRON.

CAST-IRON SYPHONS FOR MAINS.

LAMP-POSTS.

CRADLES AND BRACKETS.

— PRICE LISTS UPON APPLICATION. —

BELL'S ASBESTOS AQUOL PAINT

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY 40 PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

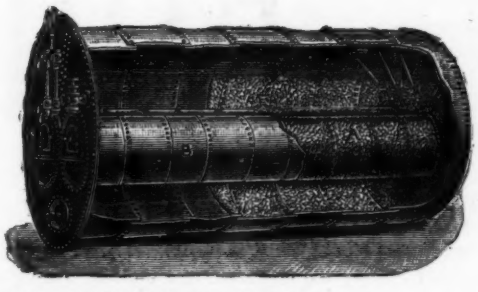
BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

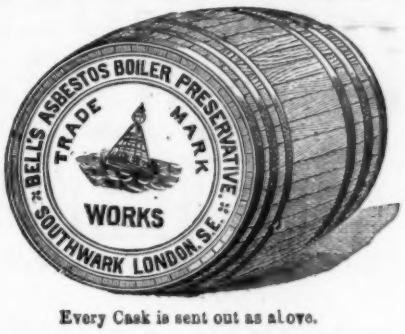
DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. BERLIN, BARCELONA, and ANTWERP.
AGENTS—BIRMINGHAM BELL and Co., John Bright Street. BRISTOL: ROBERT STOTESBURY, 114, Redcliff Street. CARDIFF: BELL and Co. West Bute Street.

BELL'S ASBESTOS BOILER PRESERVATIVE

Will remove Incrustation from Steam-Boilers of all kinds without chipping.



A shows Boiler Plates when incrusted.
B shows Boiler Plates when cleaned by this Composition.



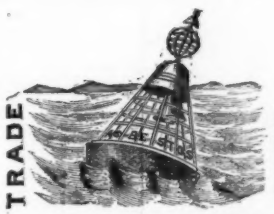
Every Cask is sent out as above.

The action of this **BOILER PRESERVATIVE,** by absorbing the free oxygen that is in the water, **entirely checks pitting and corrosion.** It also disintegrates incrustation so immediately as to prevent its adhering to the plates; and the deposit falls to the bottom in a loose powder, which is easily swept out. By keeping boilers clean, a **great economy of fuel is effected,** and the danger of the plates burning is entirely obviated; thus avoiding the great risks which are inseparable from scaled plates, lengthening the life of a boiler, and **covering its own cost a hundredfold.** Whenever possible it should be used through Feed Pump or Injector, which it will also keep clear from incrustation. The small quantity required to effect its purpose makes this the most economical, and more than repays the higher price we charge for a fluid which, in the case of many other makers, is useless.

QUANTITY REQUIRED A quarter of a pint weekly per horse power indicated; where the water is very bad rather more, or one pint for every 700 gallons of water evaporated.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.
MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street.
DUBLIN, BERLIN.



DEPÔTS.
BARCELONA, and ANTWERP.

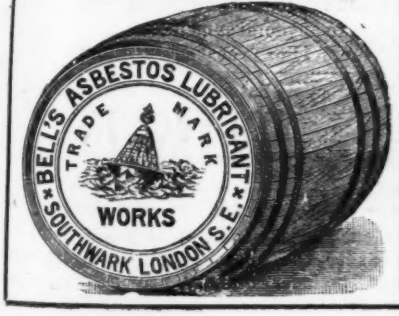
AGENTS.
BIRMINGHAM: BELL and Co., 7, John Bright Street.
BRISTOL: ROBERT STOTESBURY, 114, Redcliff Street.
CARDIFF: BELL and Co., West Bute St.

SOUTHWARK, BELL'S ASBESTOS. LONDON, S.E.

BELL'S ASBESTOS
YARN AND SOAPSTONE PACKING
BEST LOCOMOTIVE PACKING made.

BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for Hydraulic Machinery, Accumulators and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



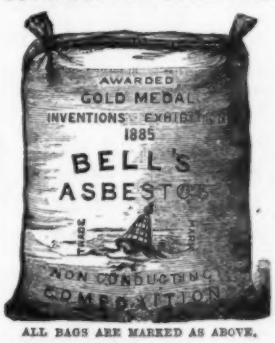
BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.

ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL. Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
EXPANSION SHEETING
RINGS, AND TAPE.
Is the most efficient and reliable Material for Manhole, Mudhole, Steam-Pipe, and all other Joints.

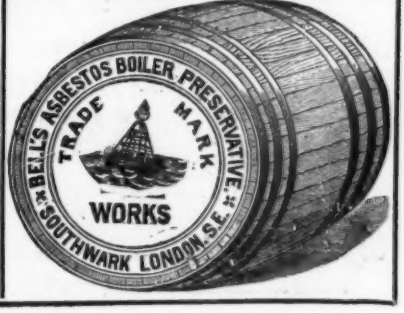
BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.
Will reduce loss by radiation and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



Can be applied again after many years' service. Is not cut by Drip in Pipes; the above cheapest thing ever used. Saves cost of coal.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS
BOILER PRESERVATIVE
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



HENRY BALFOUR & CO.,

LEVEN, FIFE,

MAKERS OF

GASHOLDERS

And all Classes of GAS PLANT,

REVOLVING BRUSH SCRUBBERS, FOUR-WAY VALVES.

LONDON: 13, BILLITER STREET, E.C.

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS,

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

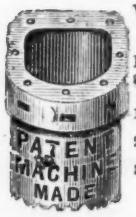
Sole Manufacturers of **LYON'S 'PATENT' GAS MAIN SYPHONS.**

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,



WORTLEY FIRE-CLAY WORKS,
Near LEEDS

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

S. PONTIFEX & CO.,

GAS and WATER ENGINEERS,

Manufacturers of and Contractors for the Maintenance of

PUBLIC LAMPS & LANTERNS;

GLASS—Flint Opal, and Bent in Stock, and Cut to Sizes

WELL LAMPS, STREET NAME TABLETS,

LAMP COLOUMNS, HEAD IRONS, PUTTYLESS LAMPS

LANTERNS COCKS, REGULATORS,

Improved High-Power Lanterns for Lighting Street Refuges and Open Spaces.

BROWN'S PATENT

LAMPLIGHTERS' TORCHES.

PROPRIETORS AND MANUFACTURERS OF

BOX'S PATENT

PUTTYLESS STREET LAMP.

This Lamp may be supplied fitted with clear opal, or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing Lamps to this system can be supplied at moderate prices.

S. PONTIFEX & CO., 22, COLEMAN ST., LONDON.

Works: 18, STEPHEN STREET, TOTTENHAM COURT ROAD, W.

MEIKLEJOHN'S

Patent

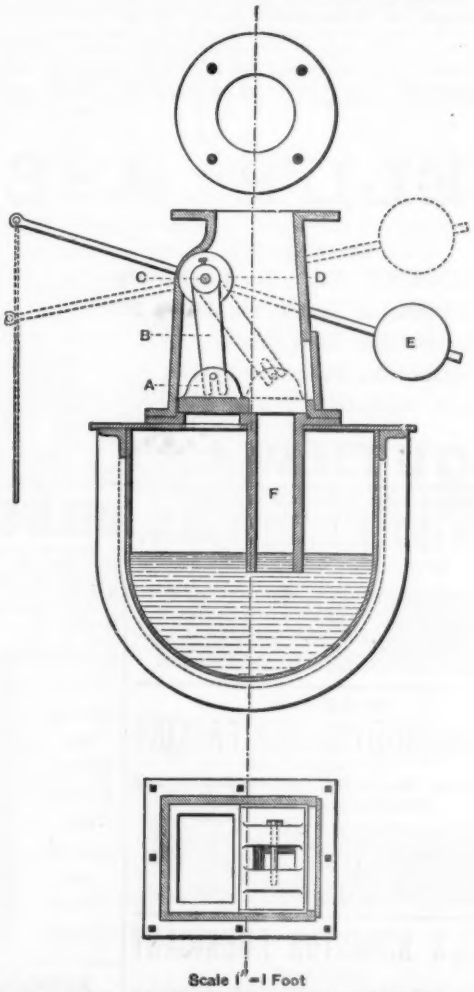
IMPROVED SLIDE-VALVE ANTI-DIP.

MR. THOS. NEWBIGGING'S REPORT.

5, Norfolk Street, Manchester, Dec. 11, 1889.

SIR,—I have examined your patent Anti-Dip arrangement, and have seen it at work on the Retort-Benches, at the Longwood Gas-Works, and the opinion which I have formed of its simplicity and certainty in working is distinctly favourable; so much so *that I consider it to be, without exception, the most efficient Appliance of the kind which has yet been introduced.* It can be applied to existing Benches with great ease, and at a minimum cost. So far as I am aware, it embodies a principle of action not previously applied in this direction.—Yours truly,

THOS. NEWBIGGING.



Scale 1" = 1 Foot

Is perfectly reliable in action, and requires no attention.
Has all the advantages of the Dip and Anti-Dip combined.
Is cheap, and easily fixed to any form of main.
Will more than save their cost in one season's working.

Further particulars from the Sole Patentee and Manufacturer

NEILL MEIKLEJOHN,

GAS ENGINEER,

LONGWOOD, HUDDERSFIELD.

*** During the serious illness of Mr. Neill Meiklejohn, all communications as to the above should be addressed to C. Meiklejohn, Gas Engineer, Oldbury, near Birmingham.

PATENT RIVET COMPANY, LTD., SMETHWICK, NEAR BIRMINGHAM.

Established 1843.

TELEGRAMS: "PRIVET, BIRMINGHAM."

MANUFACTURERS OF

BOLTS & NUTS
FOR
PIPE JOINTS,
FLANGE JOINTS,
RETORT MOUTH-PIECES,
SCRUBBERS,
CONDENSERS,
PURIFIERS,
SIEVES, TANKS,
ENGINES,
BOILERS,
&c., &c.

RIVETS
FOR
GASHOLDERS,
BOILERS,
GIRDERS,
TANKS,
COVERS,
&c., &c.; ALSO
SET SCREWS,
WASHERS,
SPIKES,
AND
FISH PLATE BOLTS.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.

TELEGRAPHIC ADDRESS: "PARKER LONDON."

FIRE BRICKS,

LUMPS, TILES,

BLOCKS, &c.

Special Bricks for Intense Heats.

GAS RETORTS.

CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

MOBBERLEY & PERRY,

Fire-Brick Works, STOURBRIDGE.

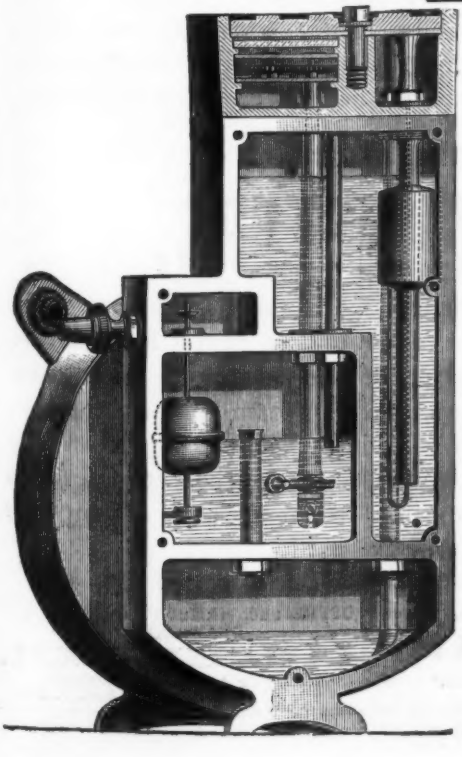
Retort Setters sent to any part of the Kingdom.

ALDER AND MACKAY,

MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.



Sole Makers of Green's Patent Underground Wet Gas-Meters for Street Lighting, &c., and Ogden's Patent Spindle Tube for Wet Gas-Meters.

GREEN'S PATENT
UNDERGROUND METER

Has been designed to obviate that which has hitherto prevented the general adoption of underground Meters—namely, their serious cost. No box is required, and the saving thus effected as compared with ordinary underground Meters, where either a box or meter-pillar is necessary, is fully one-half. The price of one for three lights is 28s., and the other sizes are correspondingly cheap. When fixed, the only part of the Meter exposed to view measures 6½ inches by 8½ inches. By the Indicator with which the Meter is fitted, the Inspector can at once discern whether water is required; but as the Meter is of the compensating description, water will probably need only be supplied ONCE A YEAR. It is advisable to fill the Meter with a non-freezing liquid, which does not injure the fittings; and this can be supplied at about 1s. per gallon.

Prices and all Information on Application.

GRANGE WORKS, EDINBURGH.

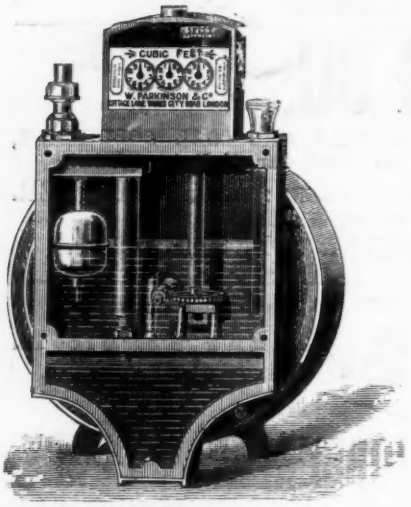
HIGHEST AWARDS given for our WET and DRY METERS at

Exhibitions held at GLASGOW, CALCUTTA, and EDINBURGH.

W. PARKINSON & Co.

— ESTABLISHED 1816 —

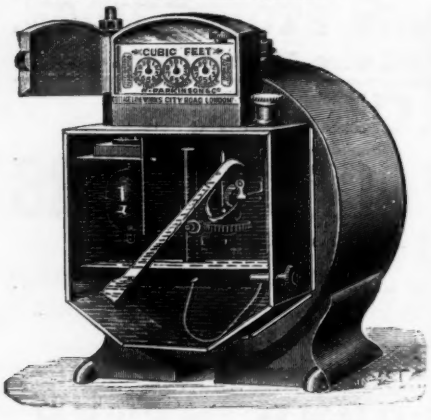
THE ORIGINAL MANUFACTURERS OF WET METERS.



ORDINARY WET METERS

IN CAST-IRON CASES.

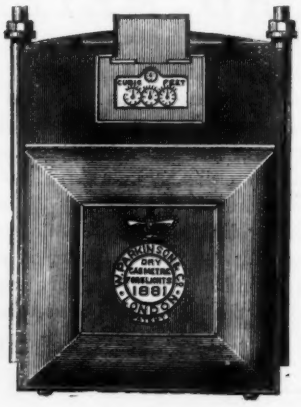
Work with very little friction. Will stand very high pressures. Cannot possibly be shut off by sudden increase of pressure, the Float being affected by Outlet Gas only. Allow for loss of water by evaporation without materially affecting the registration or shutting off the gas. Unexcelled for simplicity of construction, excellence of workmanship, or accuracy in registration.



COMPENSATING METERS

IN TINNED OR CAST-IRON CASES.

The Slow-Spoon Compensator has been in extensive use for many years; it maintains an unvarying water-line without appreciable friction, and provides a large reserve of water. The Float arrangement allows sudden or excessive pressure on the Inlet without affecting the working of the Meter or extinguishing the Lights.



DRY METERS.

These Meters are unsurpassed for accuracy of registration. The cases are made of the best Charcoal Tin Plates; and each part of the Meter is stamped by special Machinery to ensure uniformity and exactness in construction. The Diaphragms are all of the best Persian Sheep Skins, carefully selected, and the brasswork and smaller fittings are of superior workmanship.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."

OFFICE: 10, MAWSON'S CHAMBERS, DEANSGATE,
MANCHESTER.
Telegraphic Address: "PRECISION."
[See also Advt., p. 830.

London: Printed by WALTER KING (at the office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London,—Tuesday, May 5, 1891.